LG TRAINING CENTER

32LH30 PRESENTATION

LG

Life's Good

Direct View LCD

OUTLINE

Section 1

Contact Information, Preliminary Matters, Specifications,
LCD Overview, General Troubleshooting Steps,
Signal Distribution, Disassembly Instructions and Voltages

Section 2

Circuit Board Operation, Troubleshooting of :

- Switch mode Power Supply
- Main Board
- T-CON Board
- Ft Control Board
- Side Keys

32LH30 LCD Direct View Display

Section 1

This Section will cover Contact Information and remind the Technician of Important Safety Precautions for the Customers Safety as well as the Technician and the Equipment.

Basic Troubleshooting Techniques which can save time and money sometimes can be overlooked. These techniques will also be presented.

This Section will get the Technician familiar with the Disassembly, Identification and Layout of the LCD Display Panel.

At the end of this Section the Technician should be able to Identify the Circuit Boards and have the ability and knowledge necessary to safely remove and replace any Circuit Board or Assembly.

IMPORTANT SAFETY NOTICE

The information in this training manual is intended for use by persons possessing an adequate background in electrical equipment, electronic devices, and mechanical systems. In any attempt to repair a major Product, personal injury and property damage can result. The manufacturer or seller maintains no liability for the interpretation of this information, nor can it assume any liability in conjunction with its use. When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Electronics. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury. If wires, screws, clips, straps, nuts, or washers used to complete a ground path are removed for service, they must be returned to their original positions and properly fastened.

CAUTION

To avoid personal injury, disconnect the power before servicing this product. If electrical power is required for diagnosis or test purposes, disconnect the power immediately after performing the necessary checks. Also be aware that many household products present a weight hazard. At least two people should be involved in the installation or servicing of such devices. Failure to consider the weight of an product could result in physical injury.

ESD Notice (Electrostatic Static Discharge)

Today's sophisticated electronics are electrostatic discharge (ESD) sensitive. ESD can weaken or damage the electronics in a manner that renders them inoperative or reduces the time until their next failure. Connect an ESD wrist strap to a ground connection point or unpainted metal in the product. Alternatively, you can touch your finger repeatedly to a ground connection point or unpainted metal in the product. Before removing a replacement part from its package, touch the anti-static bag to a ground connection point or unpainted metal in the product. Handle the electronic control assembly by its edges only. When repackaging a failed electronic control assembly in an anti-static bag, observe these same precautions.

Regulatory Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and the receiver; Connect the equipment to an outlet on a different circuit than that to which the receiver is connected; or consult the dealer or an experienced radio/TV technician for help.

CONTACT INFORMATION

Customer Service (and Part Sales)	**(800) 243-0000**
Technical Support (and Part Sales)	**(800) 847-7597**
USA Website (GCSC)	**aic.lgservice.com**
Customer Service Website	**us.lgservice.com**
LG Web Training	**lge.webex.com**
LG CS Academy	**lgcsacademy.com**

http://136.166.4.200

LCD-DV:	**32LG40, 32LH30, 42LG60, 42LG70, 42LH20, 42LH40, 42LH50, 47LG90**
PLASMA:	**42PG20, 42PQ20, 42PQ30, 50PG20, 50PS80, 50PS60**

Also available on the Plasma page

Plasma Panel Alignment Handbook

New Training Materials on the Learning Academy site

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Safety and Handling Regulations

1. Approximately 20 minute pre-run time is required before any adjustments are performed.
2. Refer to the Voltage Sticker on the Switch Mode Power Supply silk screening. (+/- ½ volt).
3. Be cautious of electric shock from the Backlight section, it uses high voltage AC. Check that the Power Supply and Drive Circuits are completely discharged because of residual current stored before Circuit Board removal.
4. C-MOS circuits are sensitive to static electricity.
   Use caution when dealing with these IC and circuits.
5. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
6. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.

Checking Points to be Considered

1. Check the appearance of the Replacement Panel and Circuit Boards for both physical damage and part number accuracy.
2. Check the model label. Verify model names and board model matches.
3. Check details of defective condition and history. Example: Oscillator failure dead set, etc…

Basic Troubleshooting Steps

Define, Localize, Isolate and Correct

•**Define** Look at the symptom carefully and determine what circuits could be causing the failure. Use your senses Sight, Smell, Touch and Hearing. Look for burned parts and check for possible overheated components. Capacitors will sometimes leak dielectric material and give off a distinct odor. Frequency of power supplies will change with the load, or listen for relay closing etc. Observation of the front Power LED may give some clues.

•**Localize** After carefully checking the symptom and determining the circuits to be checked and after giving a thorough examination using your senses the first check should always be the DC Supply Voltages to those circuits under test. Always confirm the supplies are not only the proper level but be sure they are noise free. If the supplies are missing check the resistance for possible short circuits.

•**Isolate** To further isolate the failure, check for the proper waveforms with the Oscilloscope to make a final determination of the failure. Look for correct Amplitude Phasing and Timing of the signals also check for the proper Duty Cycle of the signals. Sometimes "glitches" or "road bumps" will be an indication of an imminent failure.

•**Correct** The final step is to correct the problem. Be careful of ESD and make sure to check the DC Supplies for proper levels. Make all necessary adjustments and lastly always perform a Safety AC Leakage Test before returning the product back to the Customer.

32LH30 Product Information

This section of the manual will discuss the specifications of the 32LH30
LCD Direct View Display Panel.

Key Features

- 32" Screen (31.5 diagonal)
- 1080p HD Resolution
- Two (2) HDMI™ (V.1.3 with Deep Color)
- ISFccc Ready
- Smart Energy Saving
- LG SimpLink™
- LG Core Technologies (32-inch and above)
- Dynamic Contrast Ratio 50,000:1
- Response Time 6ms
- Brightness 500 cd/m2
- Viewing Angle 178º H / 178º V
- Life Span (Typical) 60,000 hr
- Built-in Tuner ATSC/NTSC/Clear QAM
- Cabinet Color Glossy Piano-Black
- Limited Warranty 1 Year Parts/Labor

Panel Pixels (Lines of Resolution)

FULL HD 1080p RESOLUTION Pixels: 1920 (H) x 1080p (V)

HD RESOLUTION 720p HD Pixels: 1366 (H) × 768 (V)

	FORMATS		Lines Per Field
SD	480I	Interlaced	240 Lines
ED	480P	Progressive	480 Lines
HD	1080I	Interlaced	540 Lines
HD	720P	Progressive	720 Lines
HD	1080P	Progressive	1080 Lines

Possible Frame Rates:
24FPS
30FPS
60FPS

Interlaced
2 Fields to make a Frame

Progressive
Each Field is a Frame

Think of sync as the Panels "Refresh Rate"

BASIC PIXEL COUNTS AND LOGOS

HDTV HIGH DEFINITION TELEVISION

720P PANEL
1365 (H) × 768 (V)

FULL HD 1080P

1080P PANEL
1920 (H) x 1080 (V)

Basic Specifications (LOGO Familiarization) Page 1

Full HD 1080p Resolution
Displays HDTV programs in full 1920 x 1080p resolution for a more detailed picture.

Remote Control Familiarization

TOP PORTION

BOTTOM PORTION

Accessing the Service Menu

REMOTE BOTTOM PORTION

To access the Service Menu.

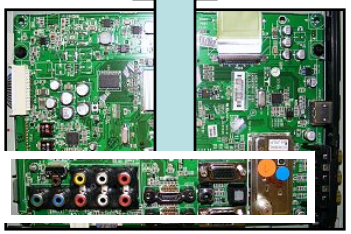
1) Turn the Set On
2) Simultaneously, Press and "Hold" the Menu Key on the Side Key pad and Press and "Hold" the Menu Key on the Remote approximately 5 seconds.
3) If Customer's Menu appears, continue to hold until it disappears.
4) The Service Menu appears

SIDE KEYS

Note: If a Password is required to enter the Service Menu. Enter;
0000

Rear and Side Input Jacks

Rear Input Jacks

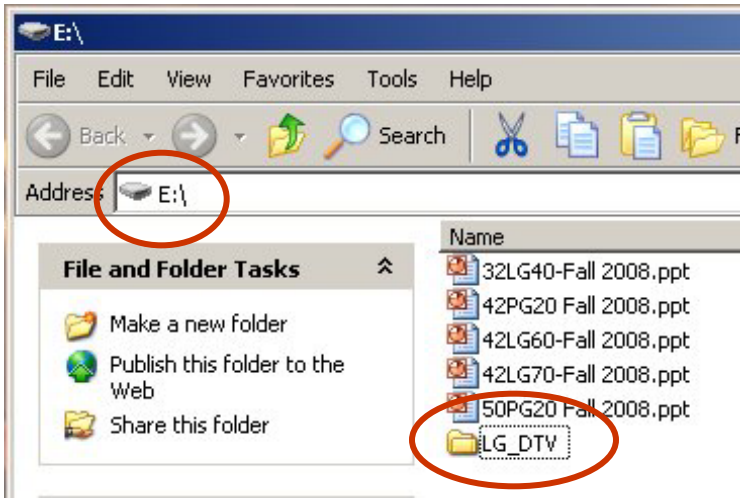


Main PWB

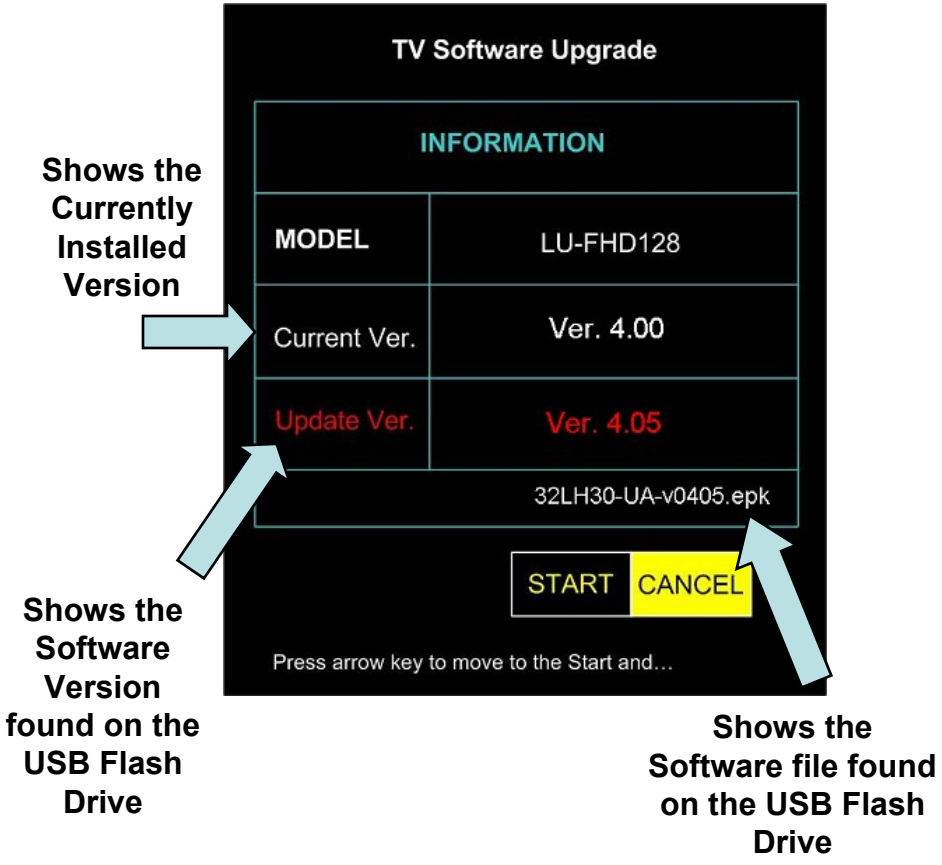
Rear Input Locations

USB Software Download

1) Create an LG_DTV folder on the USB Flash Drive

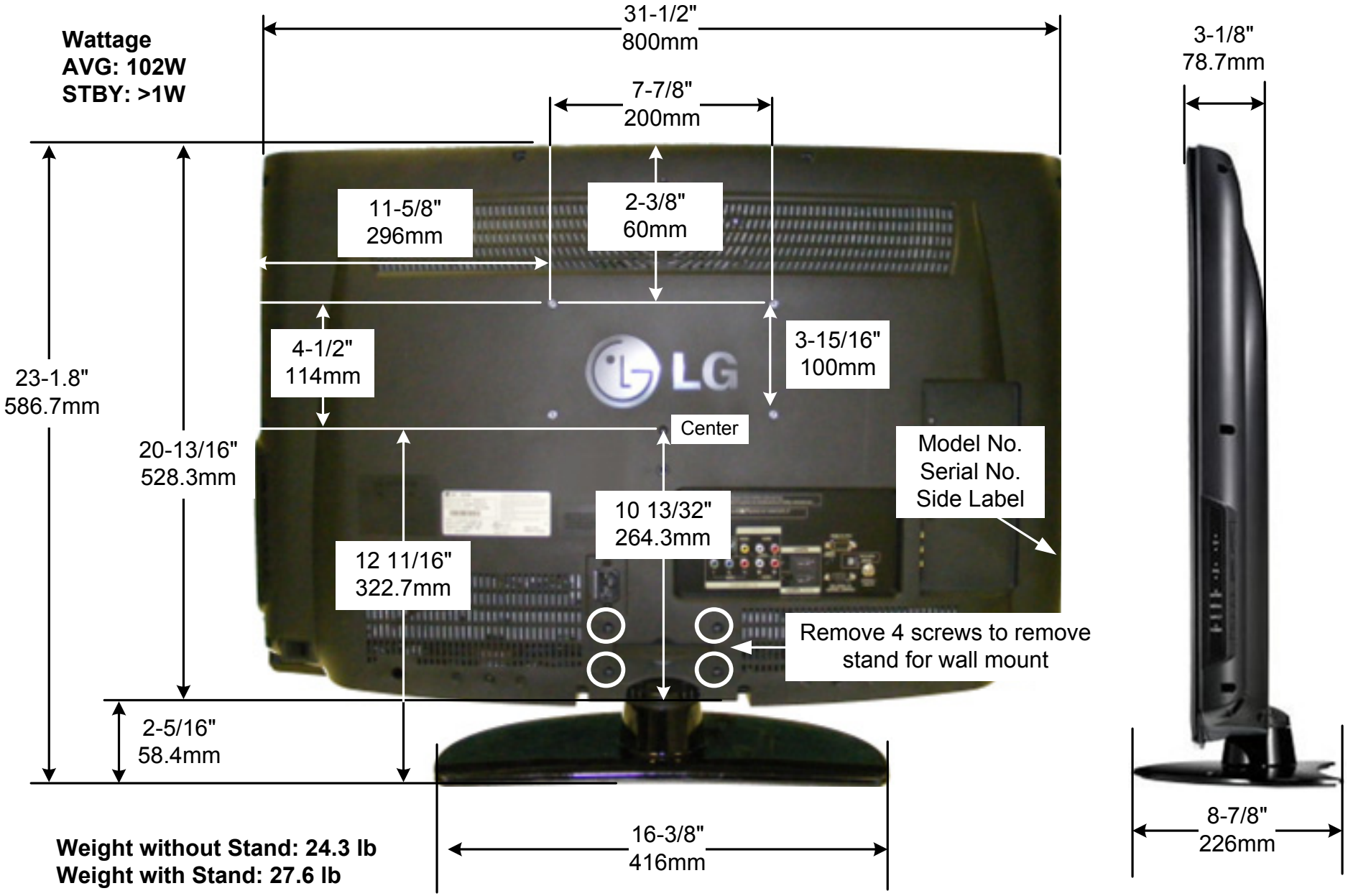


2) Copy new software (xxx.epk) to "LG_DTV" folder. Make sure to have correct software file.
3) With TV turned on, insert USB flash drive.
4) You can see the message "TV Software Upgrade" (See figure to right)
5) Cursor left and highlight "START" Button and push "Enter" button using the remote control.
6) You can see the download progress Bar.
7) Do not unplug until unit has automatically restarted.
8) When download is completed, you will see "COMPLETE".
9) Your TV will be restarted automatically.



*** CAUTION:**
Do not remove AC power or the USB Flash Drive.
Do not turn off Power, during the upgrade process.

32LH30 PRODUCT DIMENSIONS



Disassembly:
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 32LH30 LCD Direct View Television.

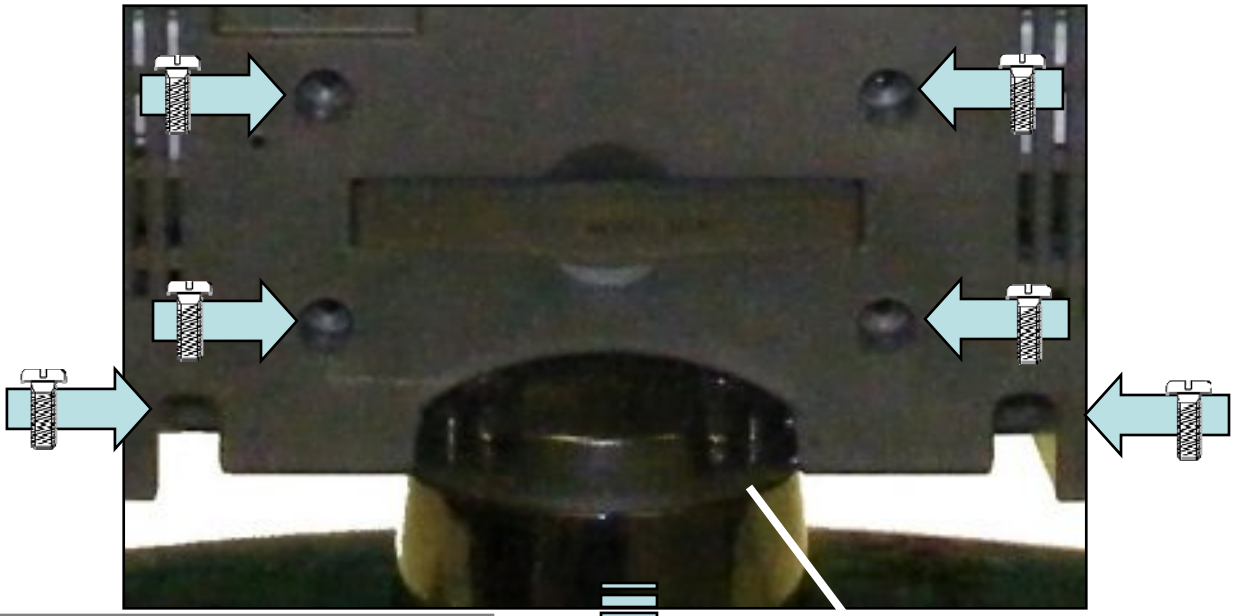
Upon completion of this section the Technician will have a better understanding of the disassembly procedures, the layout of the printed circuit boards and be able to identify each board.

Troubleshooting:
This section of the manual will also discuss troubleshooting.

Upon completion of this section the Technician will have a better understanding of how to diagnosis and resolve problems.

Removing the Back Step (1)

1 Lay the TV down on its face. Remove the 6 screws around stand indicated by the arrows.

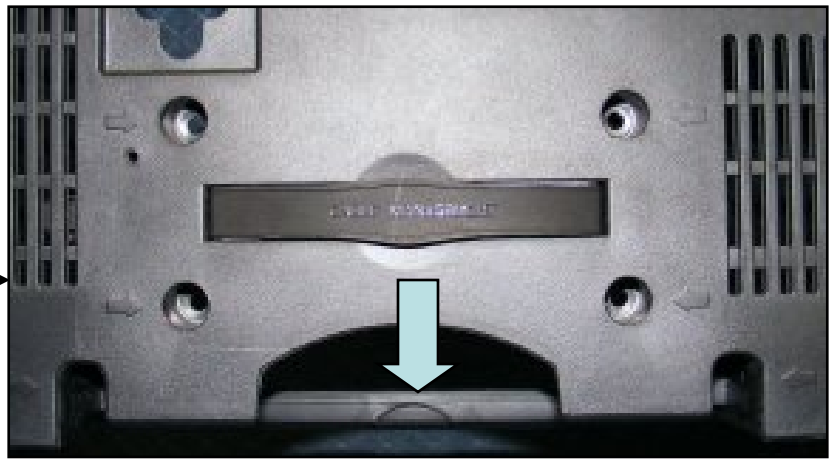


4 Reinsert the stand and stand the unit upright for service position. Put one screw into the stand to prevent it from falling out.

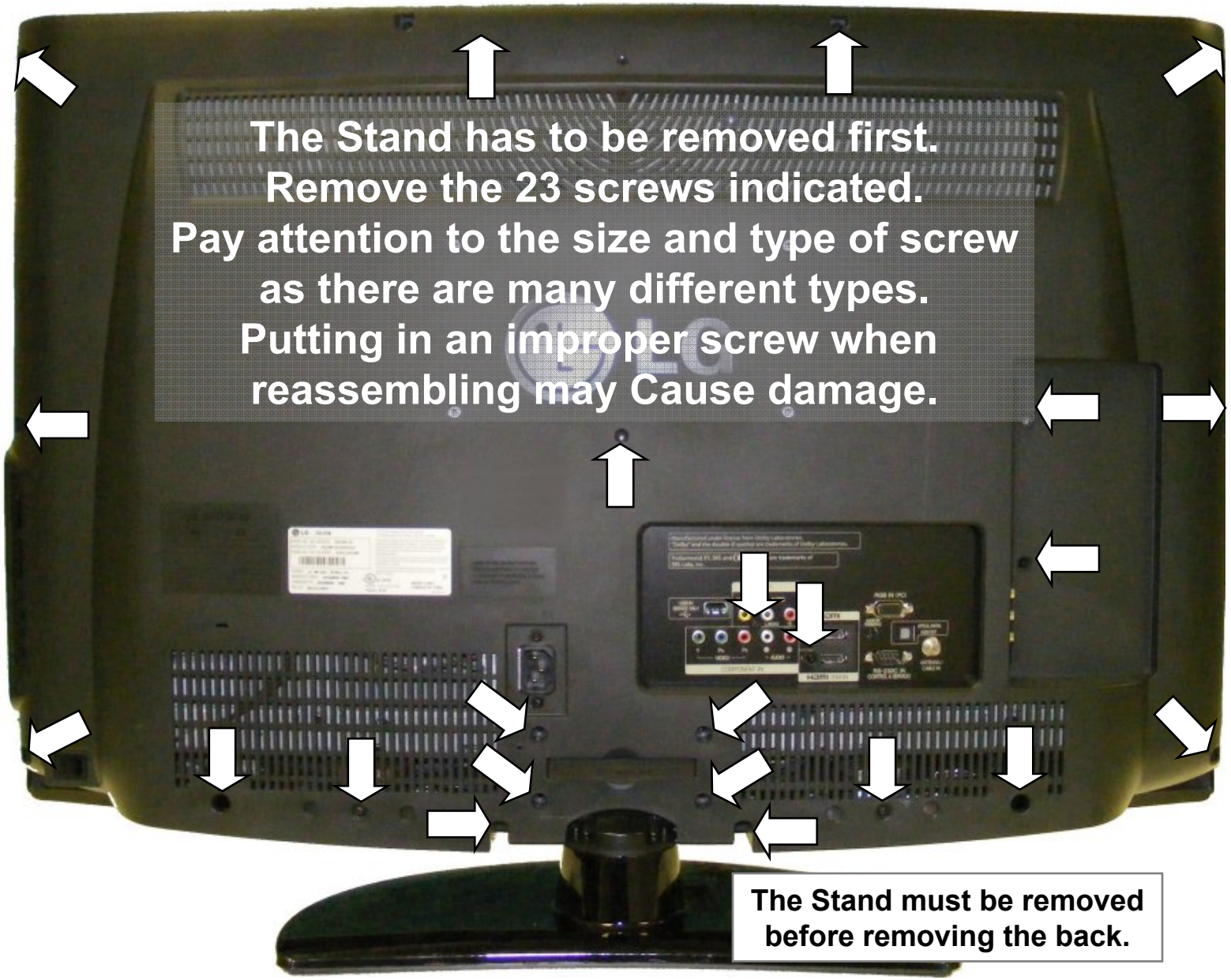
2 Remove the Stand by Pulling it out of its Retaining bracket.

Remove

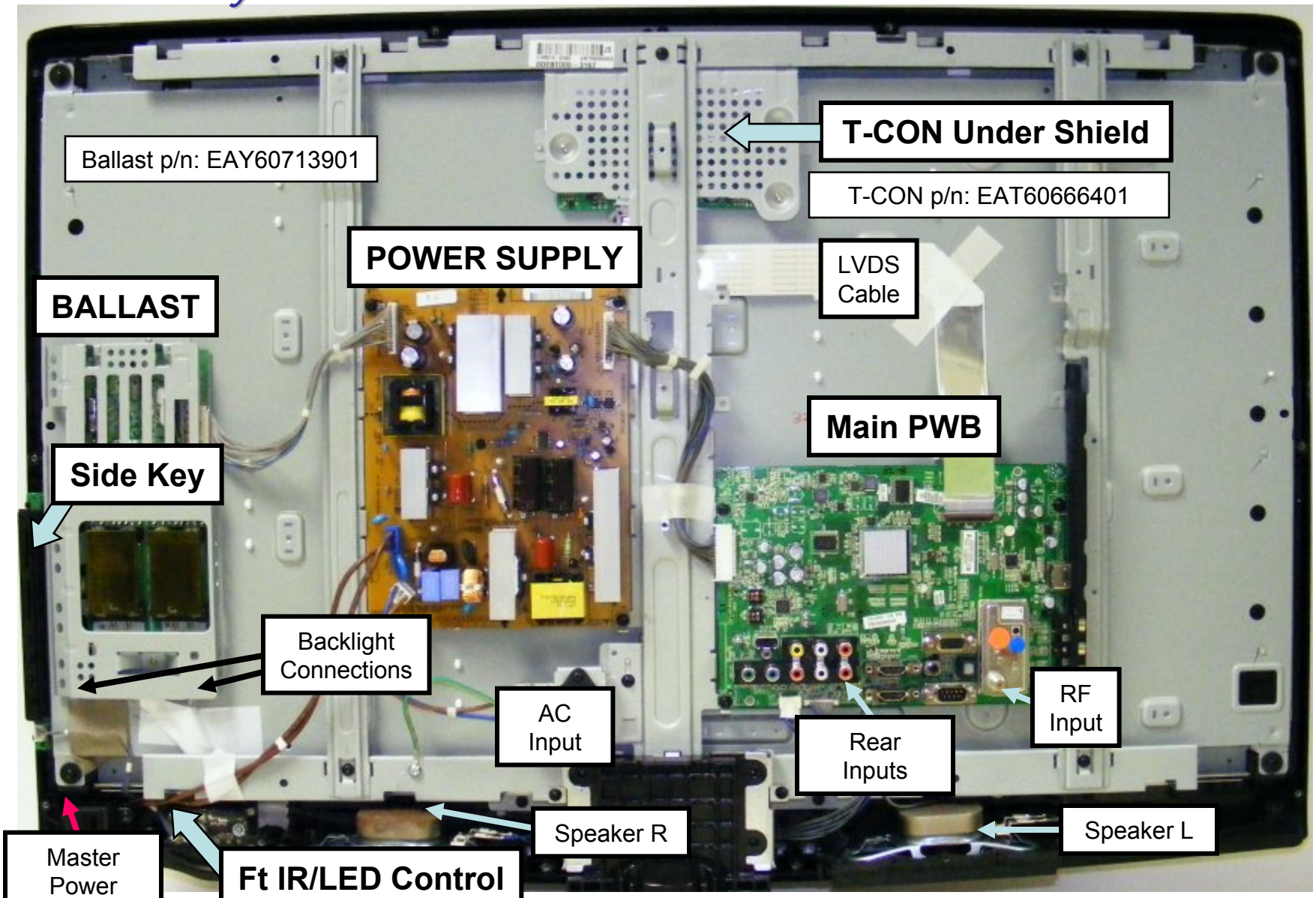
3 Notice the plastic support bar hidden behind the stand. The back can now be removed.



Removing the Back Cover Step 2 (Stand has to be removed)


The Stand has to be removed first.
Remove the 23 screws indicated.
Pay attention to the size and type of screw as there are many different types.
Putting in an improper screw when reassembling may Cause damage.
The Stand must be removed before removing the back.

Circuit Board Layout

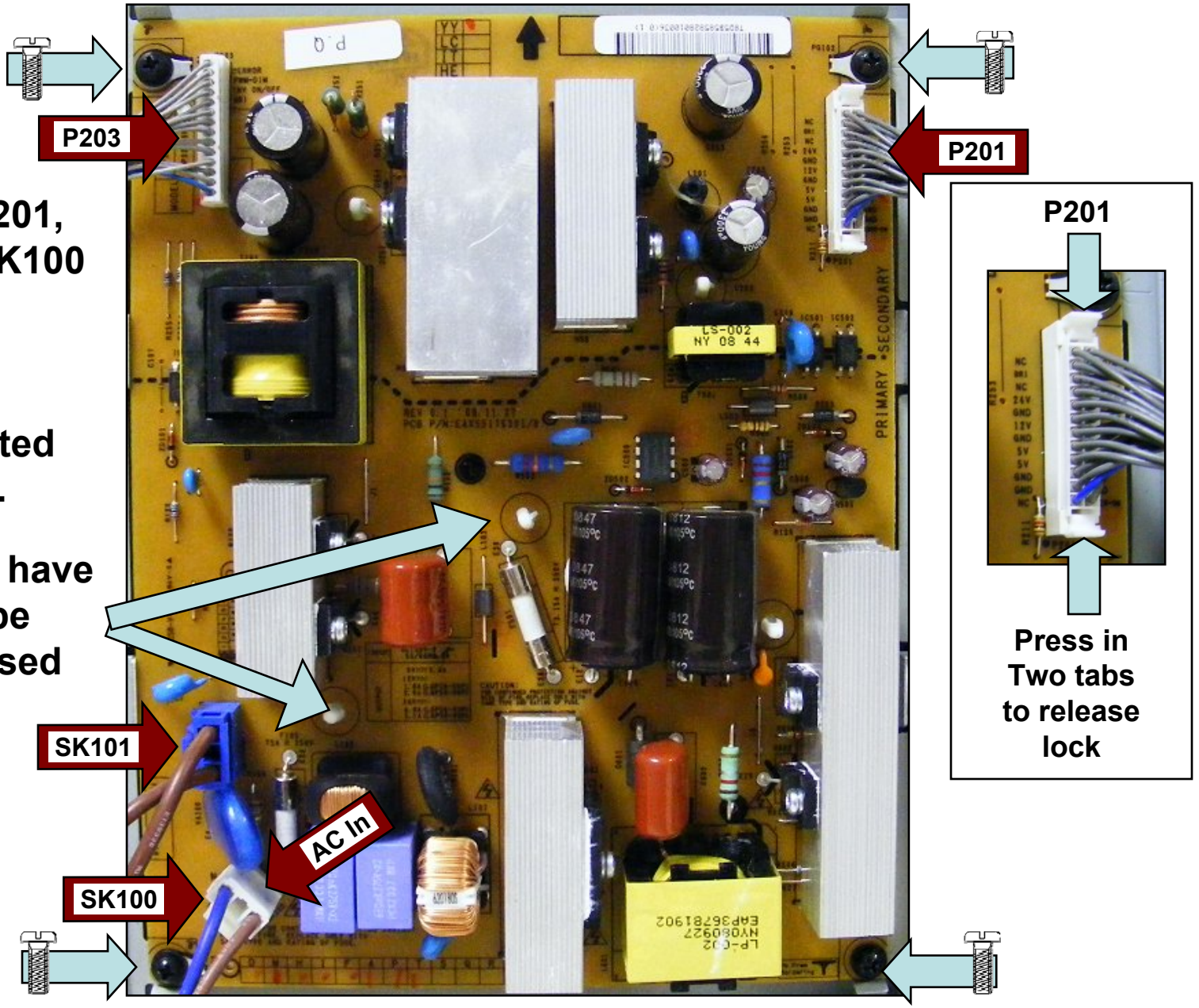


Power Supply PWB Removal

Disconnect P201, P203, AC In SK100 and SK101.

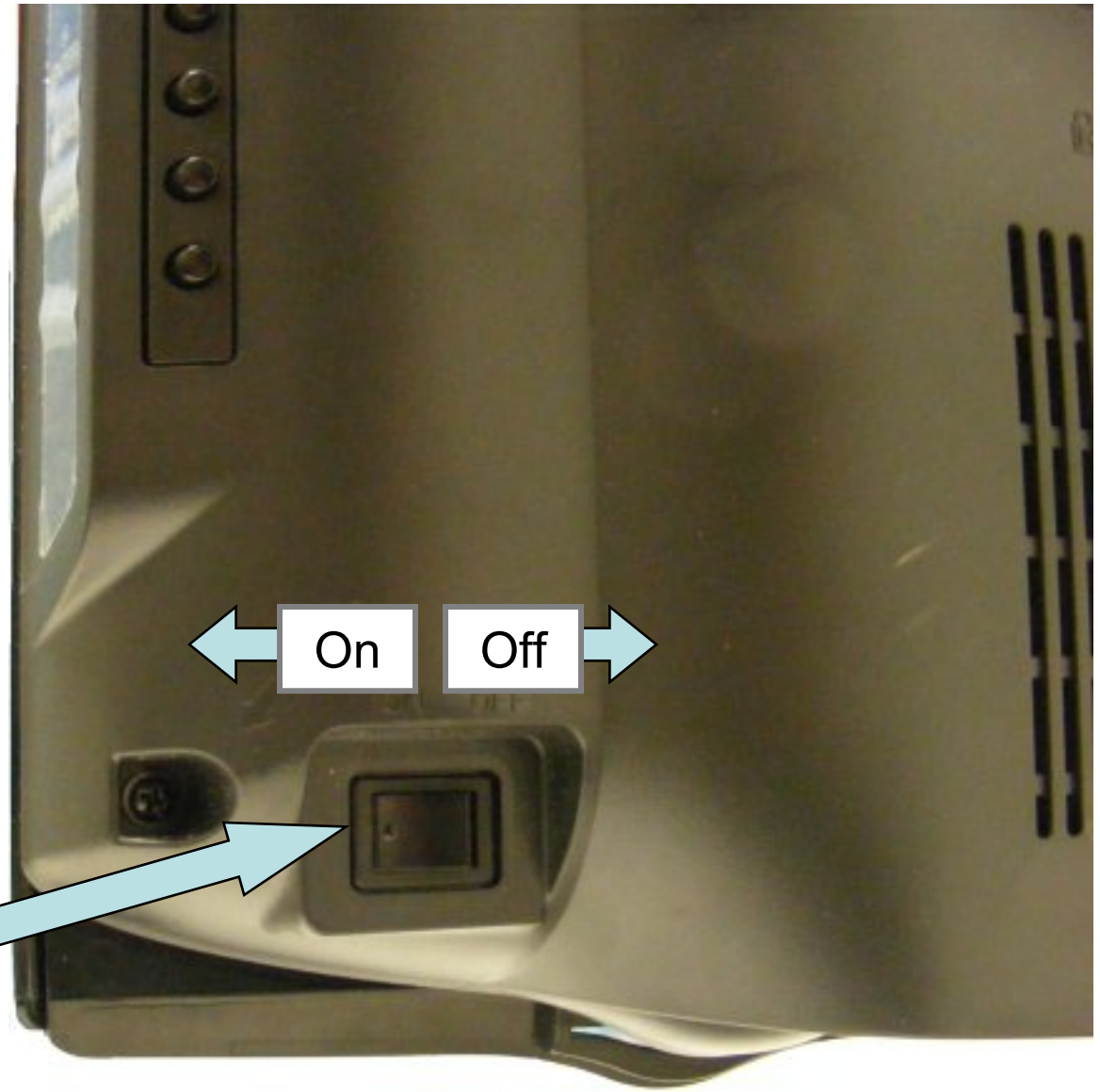
Remove the 4 screws indicated by the arrows.

Do not have to be released



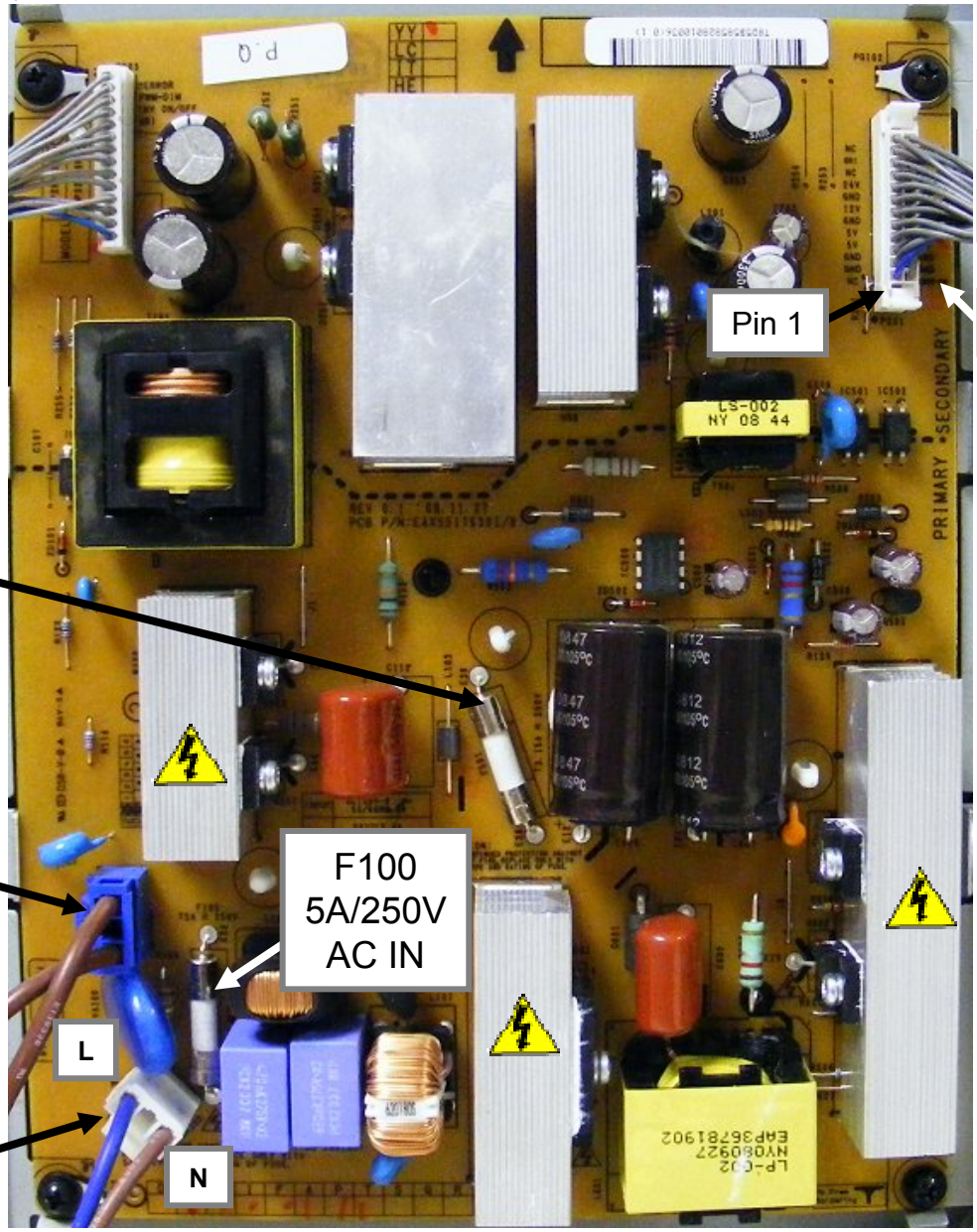
Power Supply (Master Power Switch) Location

If the TV won't come on, be sure to check the Master Power Switch before assuming a failure has occurred.

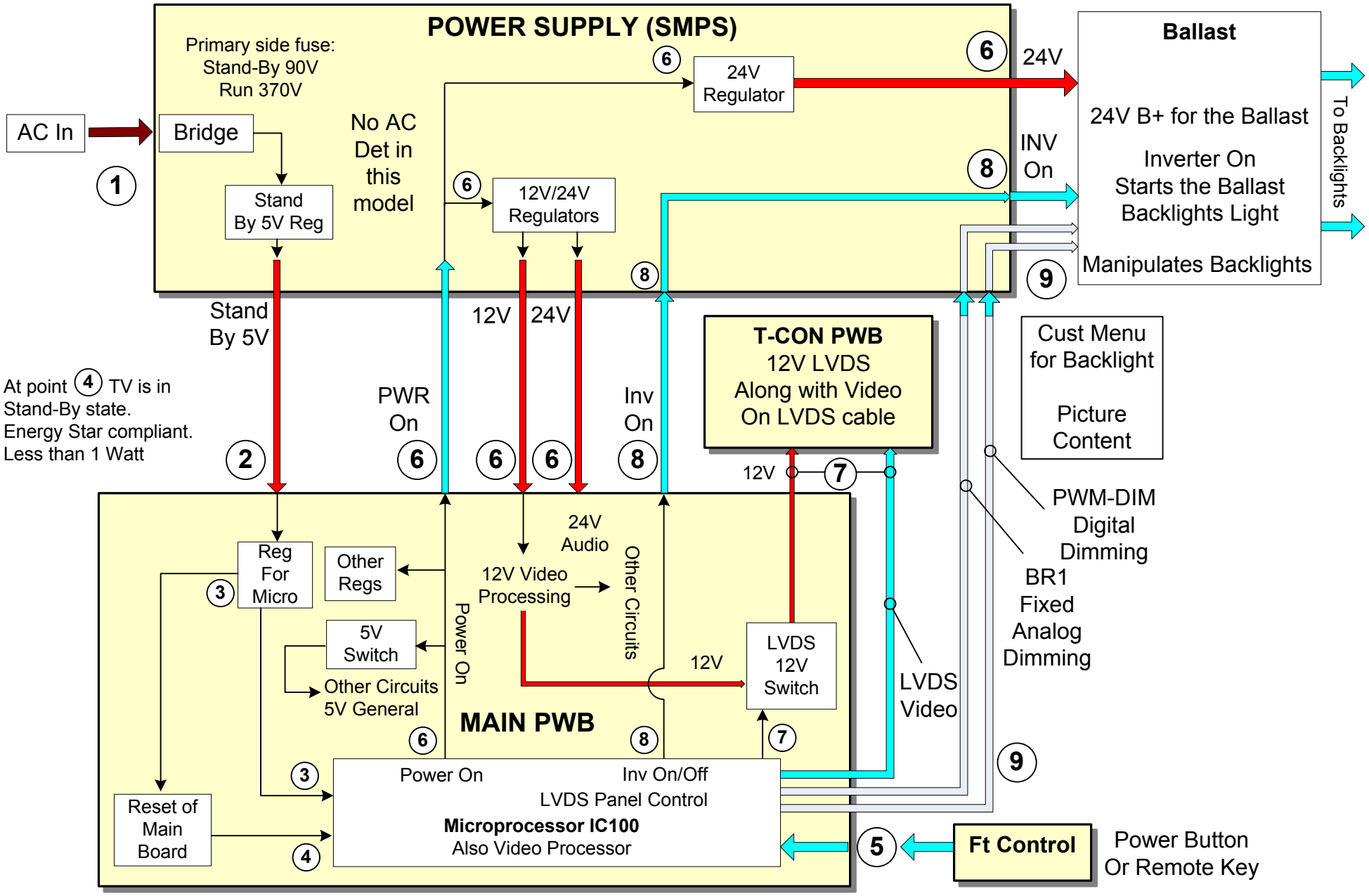


MASTER AC SWITCH LOCATION (Bottom Left Side viewed from rear)

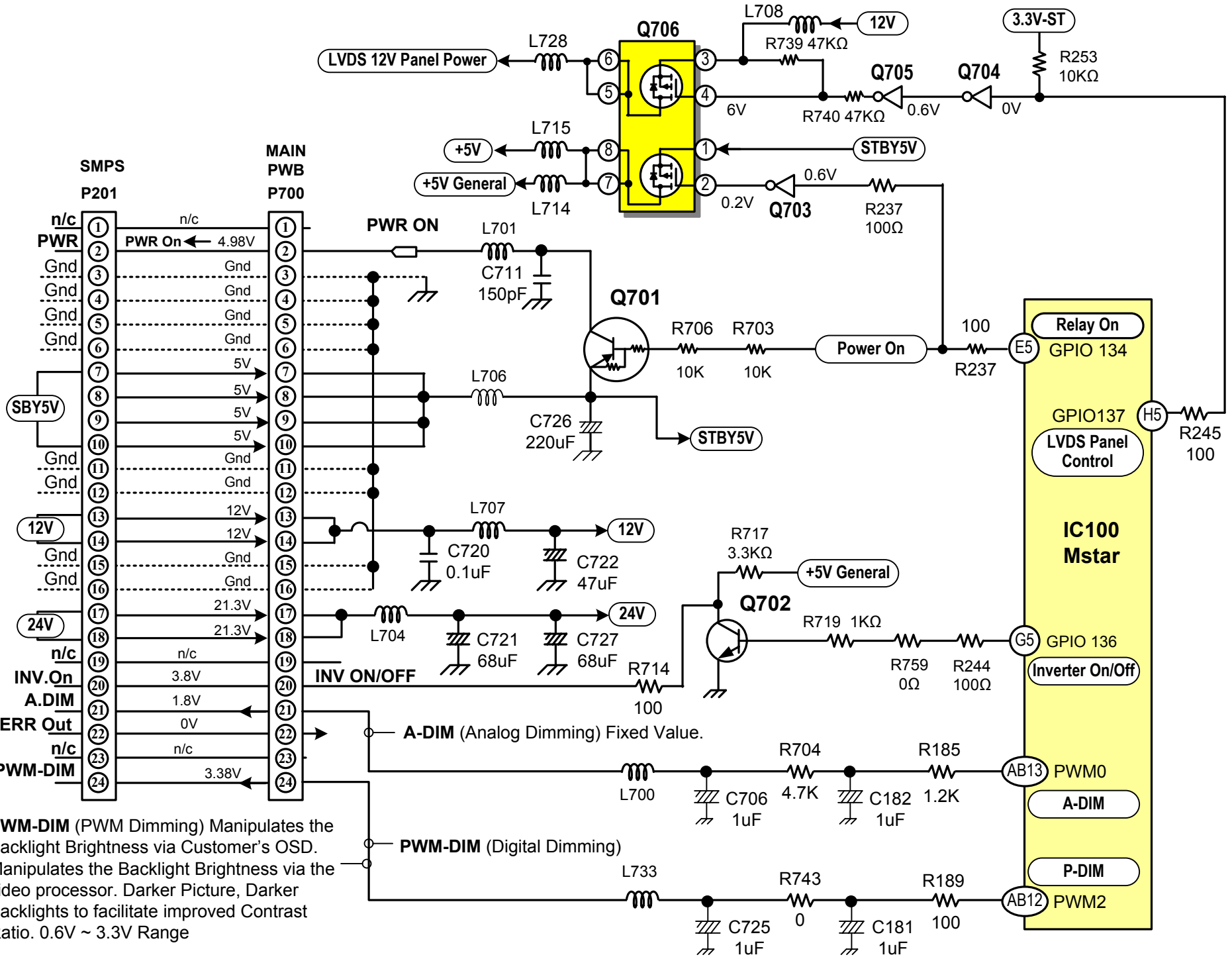
Power Supply (SMPS) PWB Layout



32LH30 POWER SUPPLY
TURN ON COMMANDS FROM MAIN PWB



32LH30 P700 ON MAIN PWB TO SMPS P201 TURN ON CIRCUIT



Power Supply Troubleshooting

Ac voltage is supplied to the Power Supply at Connector SC100. This set does not use AC Detect. The AC input generates a Hot Ground primary power supply that runs in two states, Stand-By (168) and Run (380V) measured at Fuse F501. This primary voltage develops all other voltages that are output from the power supply. During Stand-By, the 5 Volt Standby should be present at connector P201, Pins 7,8,9 or 10. If Missing remove AC Power and unplug Connector P201, apply AC Power and recheck for presence of 5 Volt Standby. Loss of 5 Volt Standby would be a Power Supply Failure. Presence of 5 Volt Standby would be an indication of a failure on the Main Board or possibly the Front PWB (IR) assembly. Suspect a possible short circuit loading the supply. **Remember to observe the Front Power Indicating LED this may save some time. A lit LED indicates the Stand-By 5V voltage is present!**

The Main Board sends two commands to the Power Supply Board one being PWR the other is INV ON. These two voltages are used to control the power on turn on sequence. First via PWR (Pin 2) also known as POWER ON, activates the Ballast voltage 24V and the 17 Volt and 12 Volt lines to the Main board. The 2nd command is INV ON (P201 pin 20). It is the Lamp Lighting Command Signal.
If either command (PWR-ON or INV-ON) is missing it will result in a no picture symptom, as the backlights will not turn on.

These voltages can easily be checked with the volt meter! Remove AC Power, unplug the Connector to the Ballast P203. Reapply AC Power and press the ON-OFF Button on either the Remote Control or Power Button on the Unit. Watch for the Power ON LED to change color from red to blue. This is an indication the PWR Signal was created on the the Main board. Check P700 or P201 pin 2 for the PWR-ON command (4.9V) to the Power Supply. Check P201 for 24V (Pins 17 or 18) and 12V (Pins 13 or 14). Confirm Pin 20 of P201 went to 3.3V. This is the INV ON signal needed to light the Lamps.
Problems with either voltage can be easily solved by following the simple steps on the next page.

TEST 1 Power Supply PWB Low Voltage Test

AC Should not be applied at any time while adding resistors or while unplugging connectors as damage to the circuit PWB may occur.

a) The SMPS PWB "MUST" be producing STBY 5V on either pin 7, 8, 9 or 10 (5V).

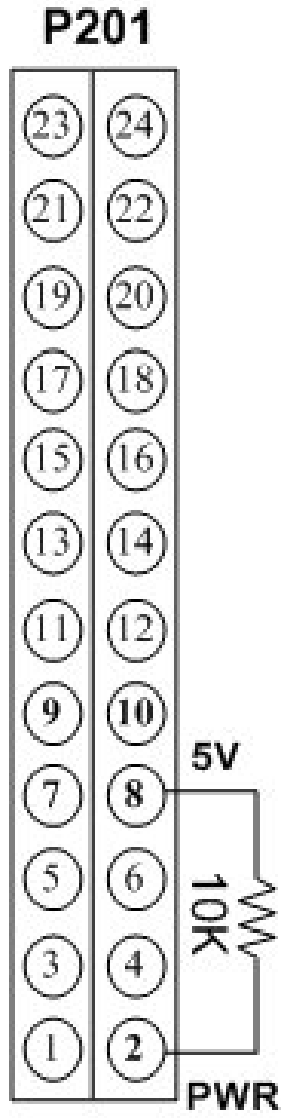
If 5V Standby is not being generated, the SMPS PWB is defective and must be replaced. There is no need to continue with the next test.

(b) Unplug P700 on the Main PWB and P203 to the Ballast.

TEST 1:

(1) Add a 10K resistor between (5V STBY) pin 7, 8, 9 or 10 and Pin 2 (PWR). Apply AC. This will turn on the power supply.
a) **Check that the 24V and 12V power supplies are turned on, P201 (24V pins 17 and 18) (12V pins 13 and 14) and 24V to the Ballast P203 Pins 1~5.**

(2) Remove AC power. Reinsert the plug P203 to the Ballast.



Use P700 Side to insert resistors

TEST 2 Power Supply PWB Backlights Test

P700 Connector disconnected from the Main PWB.
Apply AC after adding jumper.

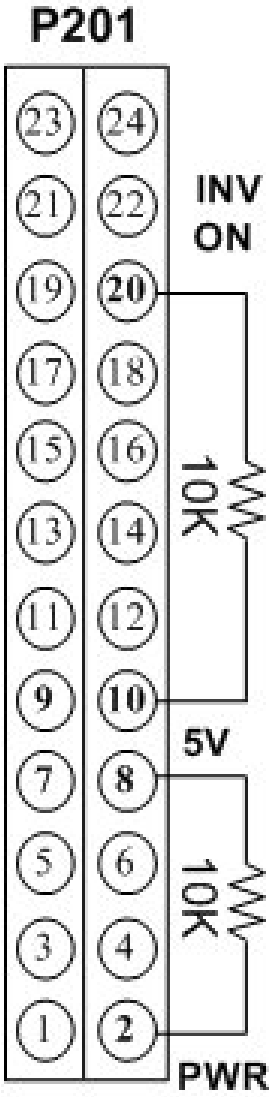
Continue if the 1st test was successful. Leave original 10K resistor in place.

(3) Add another 10K resistor between (5V) pin 7, 8, 9 or 10 and Pin 20 (INV On).

(4) Apply AC Power. This simulates a Power On and Backlight On command.

Backlights Normal:
a) If normal, the backlights should turn on.
Backlights Abnormal:
b) Recheck connector P203 and confirm 24V on pins 1~5.
1) If low or missing, use diode mode to check the 24V line on Ballast connector CN1. If low, this indicates a shorted output FET).
2) If open, check the Ballast Fuse, possible Open.
c) Confirm the INV On/Off line P203 Pin 10 is going to 3V.

REMOVE AC POWER:
d) Check the connections to the Backlights. DO NOT check these when AC is applied as they carry 1.2Kv each.



Use P700 Side to insert resistors

Power Supply Connector P201 Voltage and Diode Check

P201 Odd "SMPS" to P700 "Main PWB"

Pin	Label	STBY	Run	Diode Check
23	nc	nc	nc	nc
21	[1]BR1	0V	1.66V	Open
19	nc	nc	nc	nc
17	24V	0V	24.8V	0.73V
15	Gnd	Gnd	Gnd	Gnd
13	12V	0V	12.3V	Open
11	Gnd	Gnd	Gnd	Gnd
9	5V	5.14V	5.14V	Open
7	5V	5.14V	5.14V	Open
5	Gnd	Gnd	Gnd	Gnd
3	Gnd	Gnd	Gnd	Gnd
1	nc	nc	nc	nc

[1] BR1 (A-DIM) Pin 21 Fixed and not used

P201 Even "SMPS" to P700 "Main PWB"

Pin	Label	STBY	Run	Diode Check
24	[2]PDIM	0V	3.2V	Open
22	Err Out	0V	0V	Open
20	INV.ON	0V	4.67V	Open
18	24V	0V	24.8V	0.73V
16	Gnd	Gnd	Gnd	Gnd
14	12V	0V	12.3V	Open
12	Gnd	Gnd	Gnd	Gnd
10	5V	5.14V	5.14V	Open
8	5V	5.14V	5.14V	Open
6	Gnd	Gnd	Gnd	Gnd
4	Gnd	Gnd	Gnd	Gnd
2	PWR-ON	0V	4.99V	Open

[2]PDIM Pin 24 can vary according to type of signal being processed and the OSD Backlight setting. 0.6V 0% to 3.3V 100%. Output from the video processor chip.

Diode Check taken with meter in Diode Mode with all Connectors Removed

Power Supply P203 to Ballast CN1 Voltage and Diode Check

P203 "SMPS" to CN1 "Ballast"

Pin	Label	STBY	Run	Diode Check
1	VBL	0V	24.52V	0.729V
2	VBL	0V	24.52V	0.729V
3	VBL	0V	24.52V	0.729V
4	VBL	0V	24.52V	0.729V
5	VBL	0V	24.52V	0.729V
6	Gnd	Gnd	Gnd	Gnd
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	Gnd	Gnd	Gnd	Gnd
10	Gnd	Gnd	Gnd	Gnd
11	VBR_A	0V	1.67V	Open
12	On/Off	0V	3.45V	Open
13	VBR_B	0V	3.40V	Open
14	Error	0V	0V	Open

Diode Check taken with meter in Diode Mode with all Connectors Removed

Power Supply Connector SK100 and SK101 Voltage and Diode Check

Diode Check taken with meter in Diode Mode with all Connectors Removed

SK100 "SMPS" to AC IN

Pin	Label	STBY	Run	Diode Check
1	L	120Vac		OL
2	N			OL

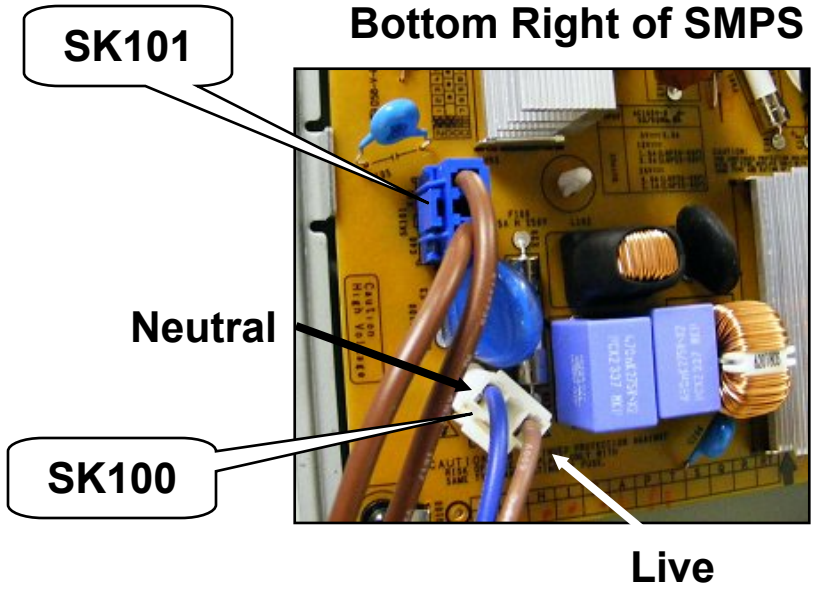
AC Voltage Readings Across Pins 1 and 2 for STBY and RUN.

SK101 "SMPS" to MASTER POWER SWITCH

Pin	Label	STBY	Run	Diode Check
1	n/a	120Vac		OL
2	n/a			OL

AC Voltage Readings for either pin 1 or pin 2 in STBY and RUN with one lead on Neutral of SK101.

With the Master Power Switch Closed (On) AC flows. When Open (Off) AC open and does not flow.



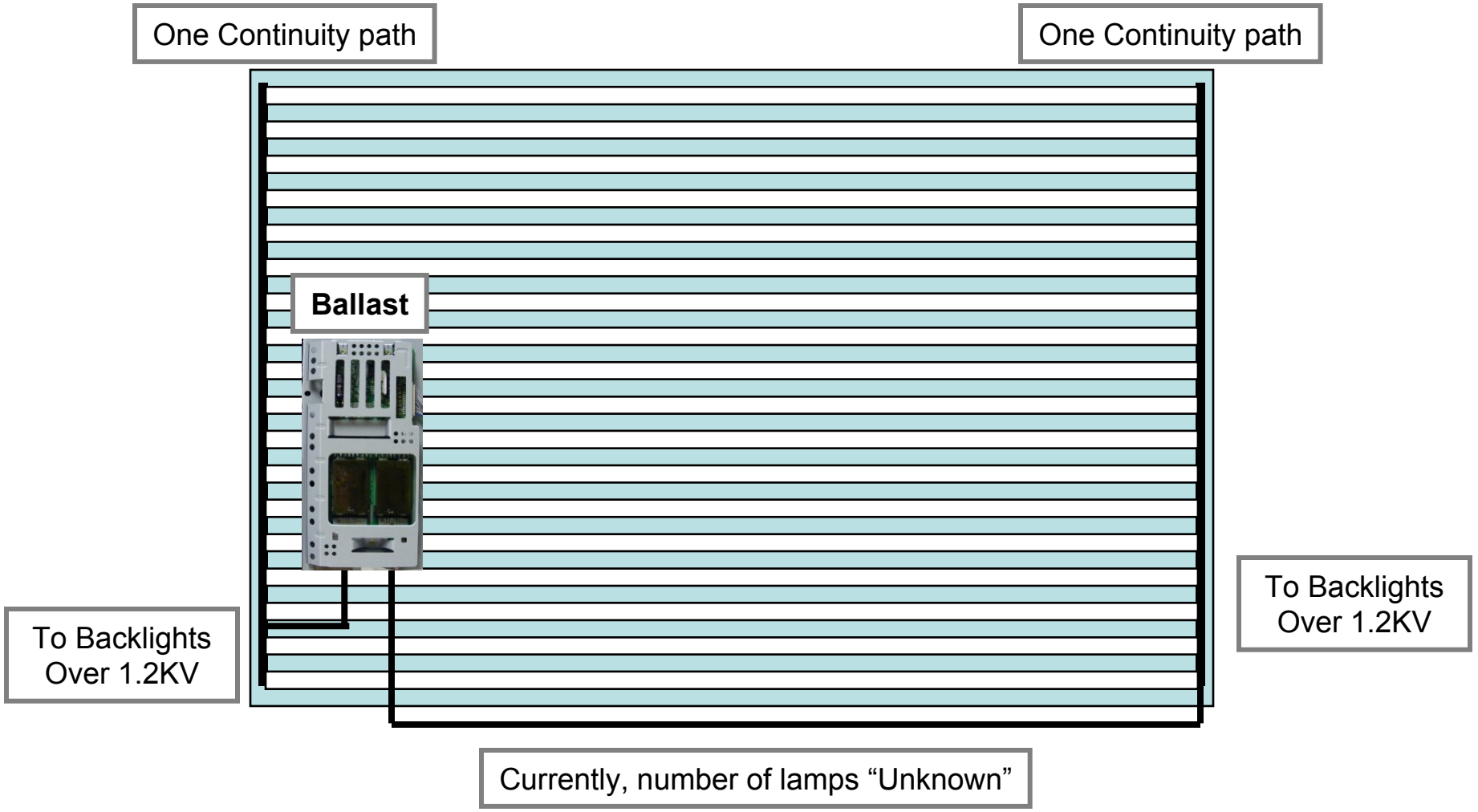
Ballast Board

The Ballast receives it B+ from the Switch Mode Power Supply. 24V (CN1 pins 1~5) is delivered when the “Power On” command arrives at the SMPS.

The Backlights are turned on with the “Inverter On” command arrives. INV-ON is sent from the Main board through the SMPS to the Ballast.

The Backlights are manipulated by the control signal “P-DIM (Digital Dimming)” CN1 pin 13.

General Backlight Information



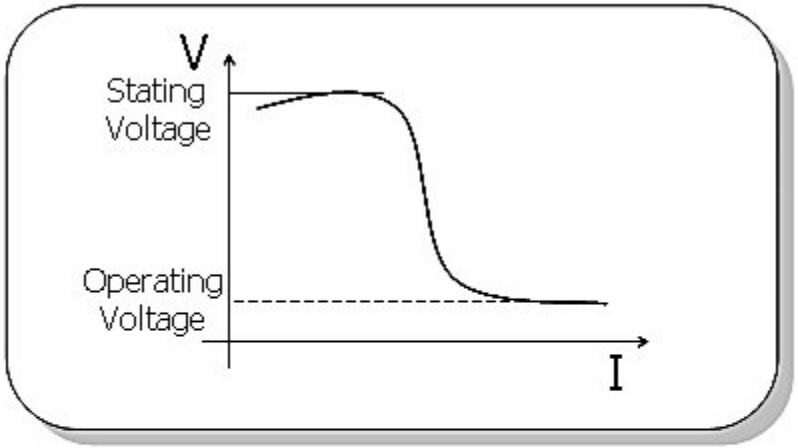
EEFL (External Electrode Fluorescent Lamp)

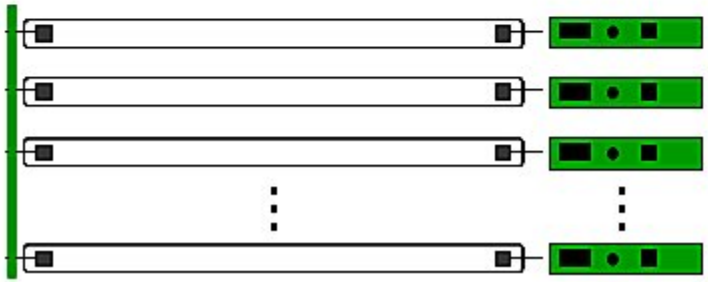
LOW COST Large number of lamps driven by a single inverter

Introducing EEFL

Simple structure, Low price

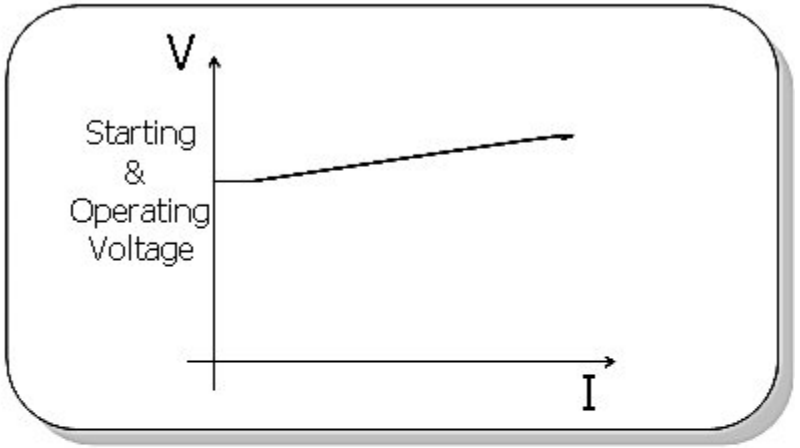
CCFL (Cold Cathode Fluorescent Lamp)

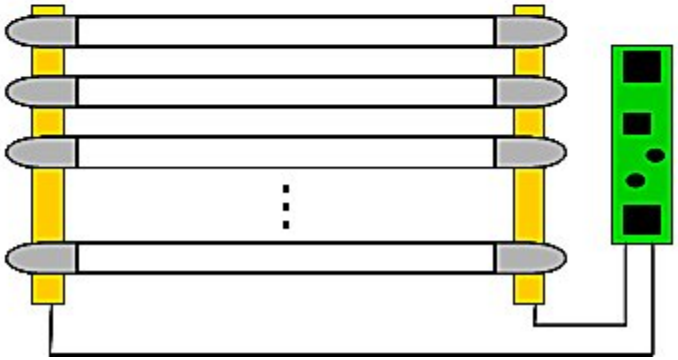




Complicated structure

EEFL (External Electrode Fluorescent Lamp)





Simple structure

Lamp manufacturing process
Lamp assembly structure

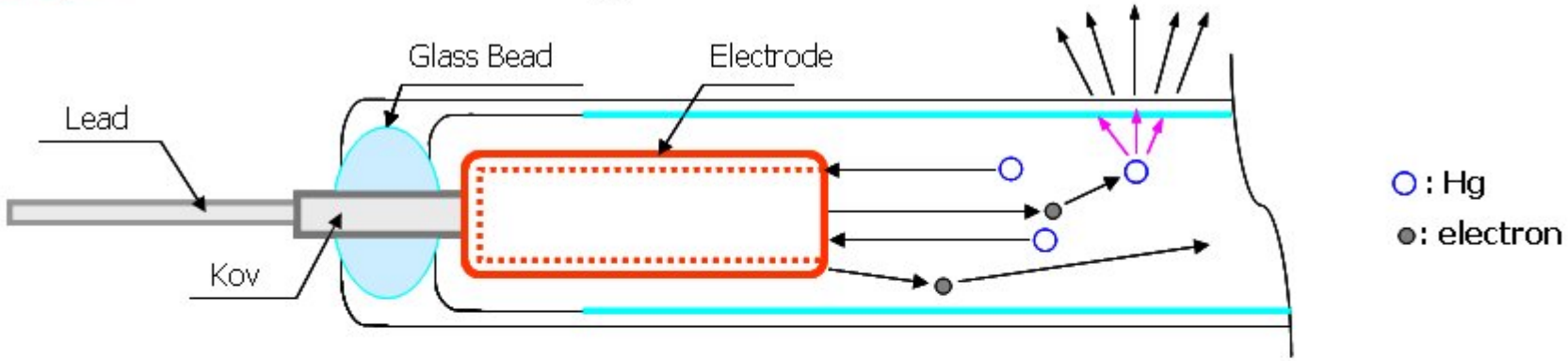
Low Cost

Large number of Lamp
Drive by single inverter

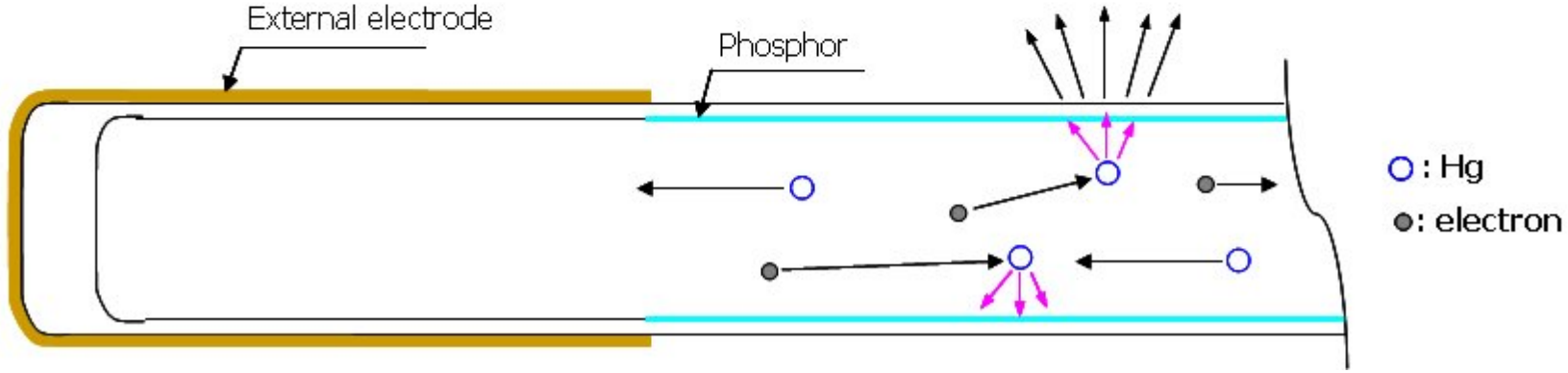
EEFL Compared to CCFL Electrodes

Key: Long Life Time

CCFL (Cold Cathode Fluorescent Lamp)

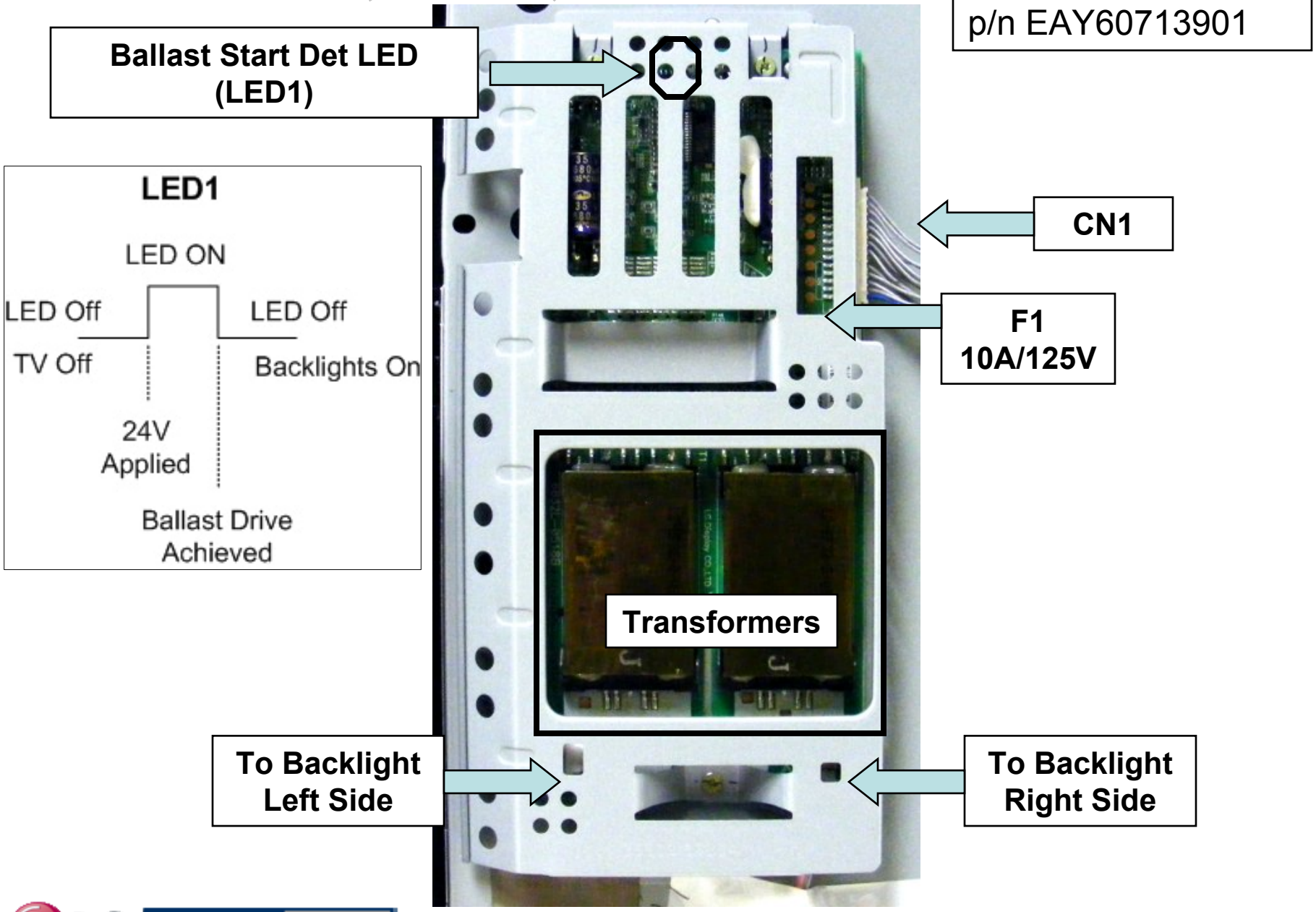


EEFL (External Electrode Fluorescent Lamp)



- **For CCFL, Hg gas is consumed mainly near the internal electrode**
- **For EEFL, longer life time is expected because there is no internal electrode consuming Hg gas**

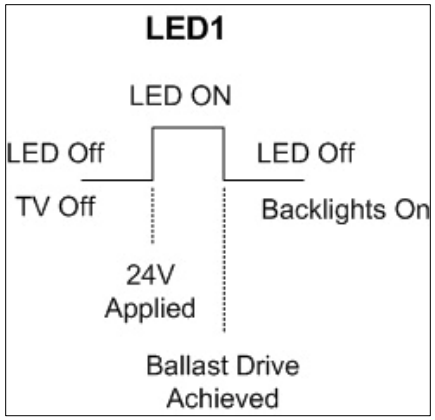
Ballast PWB Assembly (With Shield) Layout

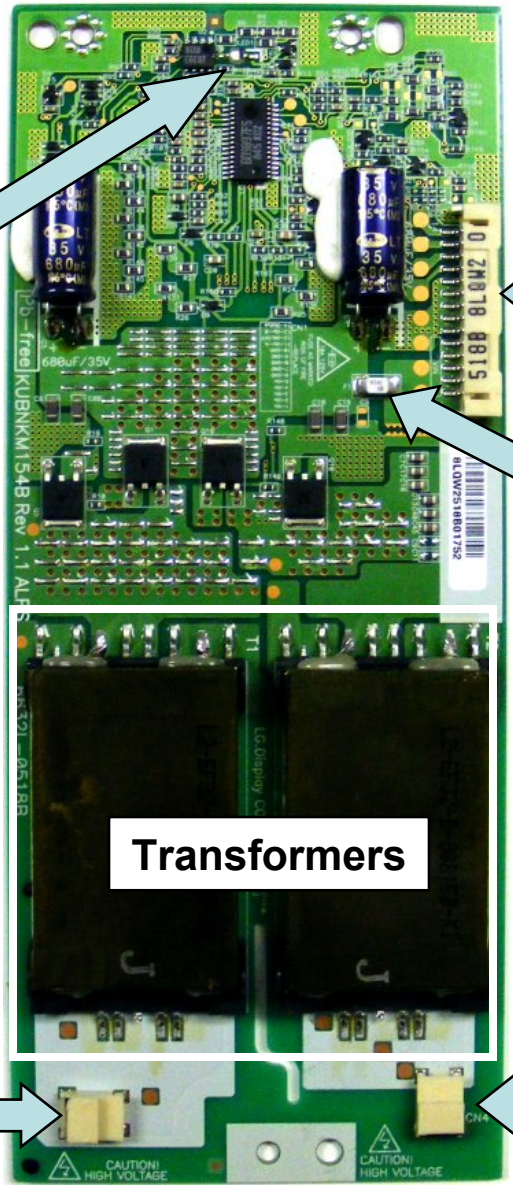


Ballast PWB Assembly Layout

Warning
Do not Run the Ballast with Shield Removed.

Ballast Start Det LED LED1





CN1

F1 10A/125V

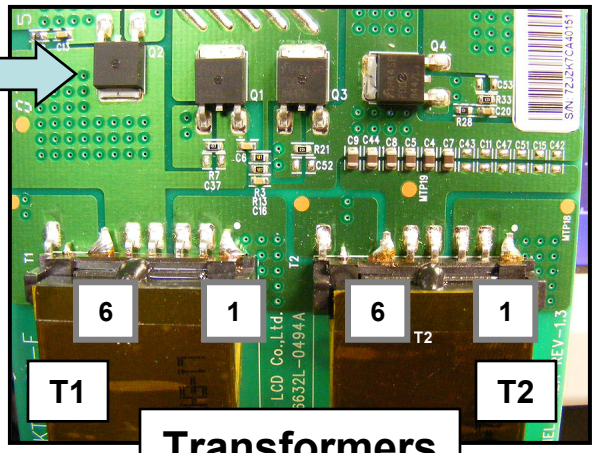
To Backlight Left Side

To Backlight Right Side

Ballast Transformer Waveforms

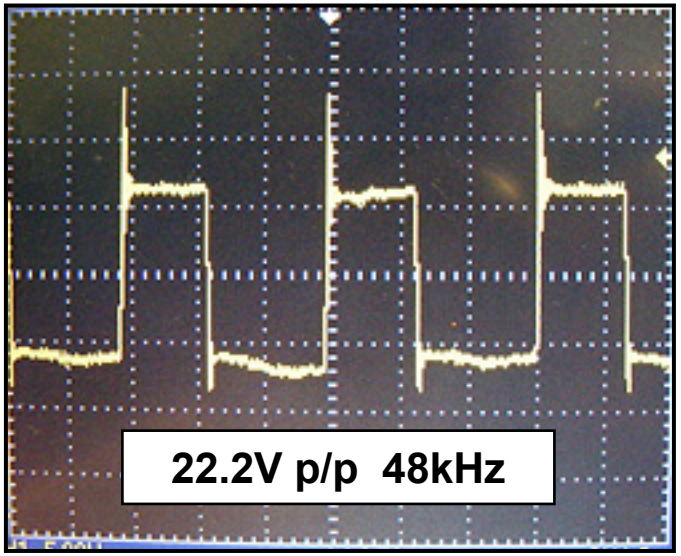
FET Drivers

Primary Side

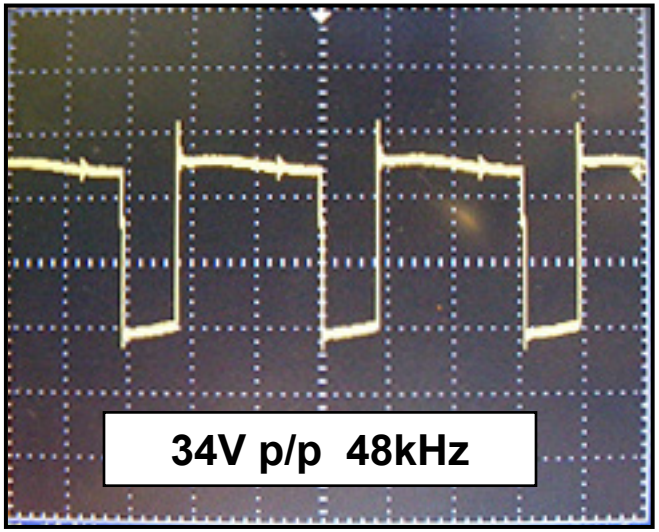


Warning
Do not Run the Ballast with Shield Removed.

Warning, secondary is over 1.2Kv

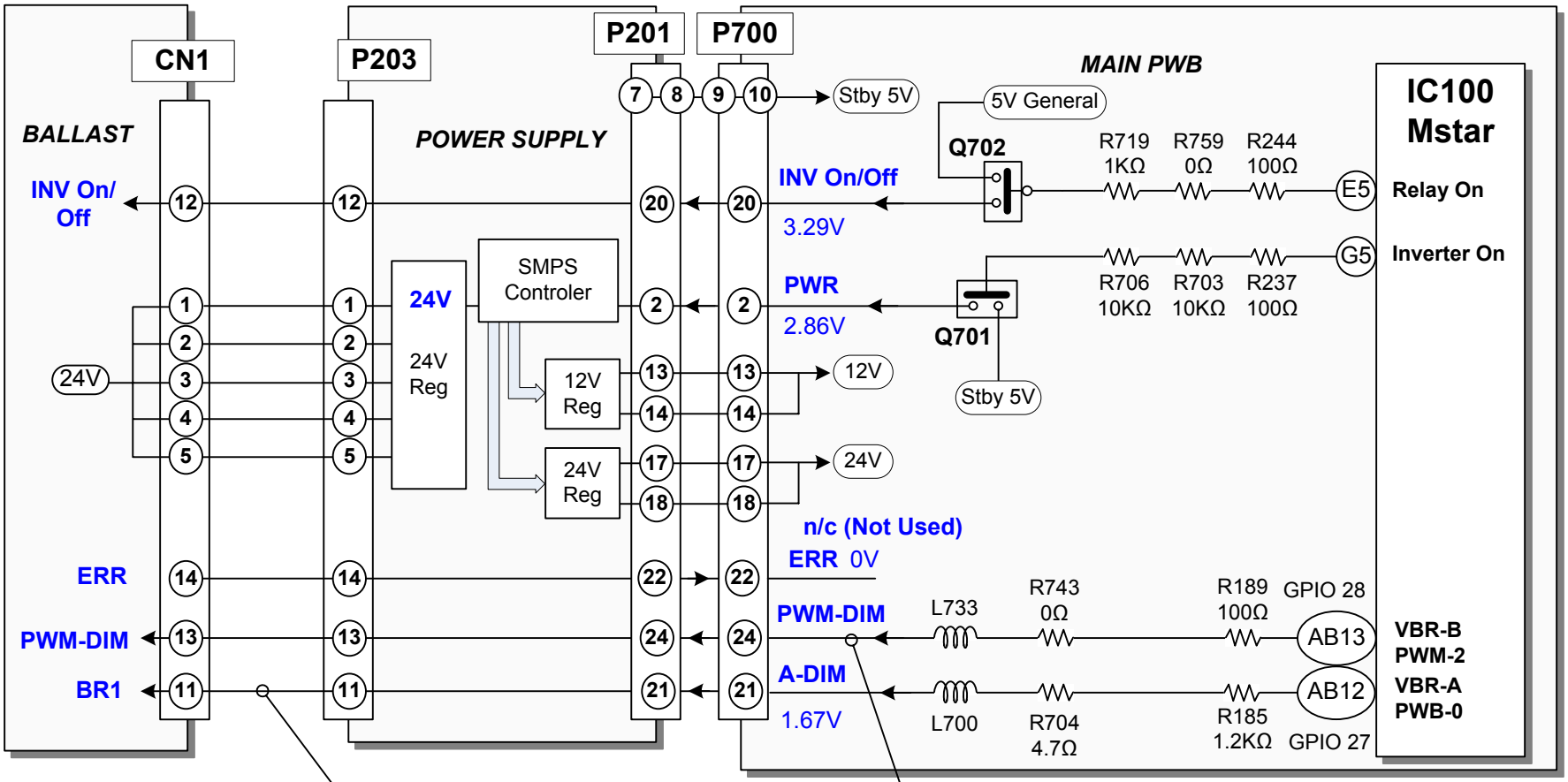


T1 or T2 Pin 1



T1 or T2 Pin 6

32LH30 P700 on Main PWB To Power Supply P201 Out P203 To Ballast MCN1



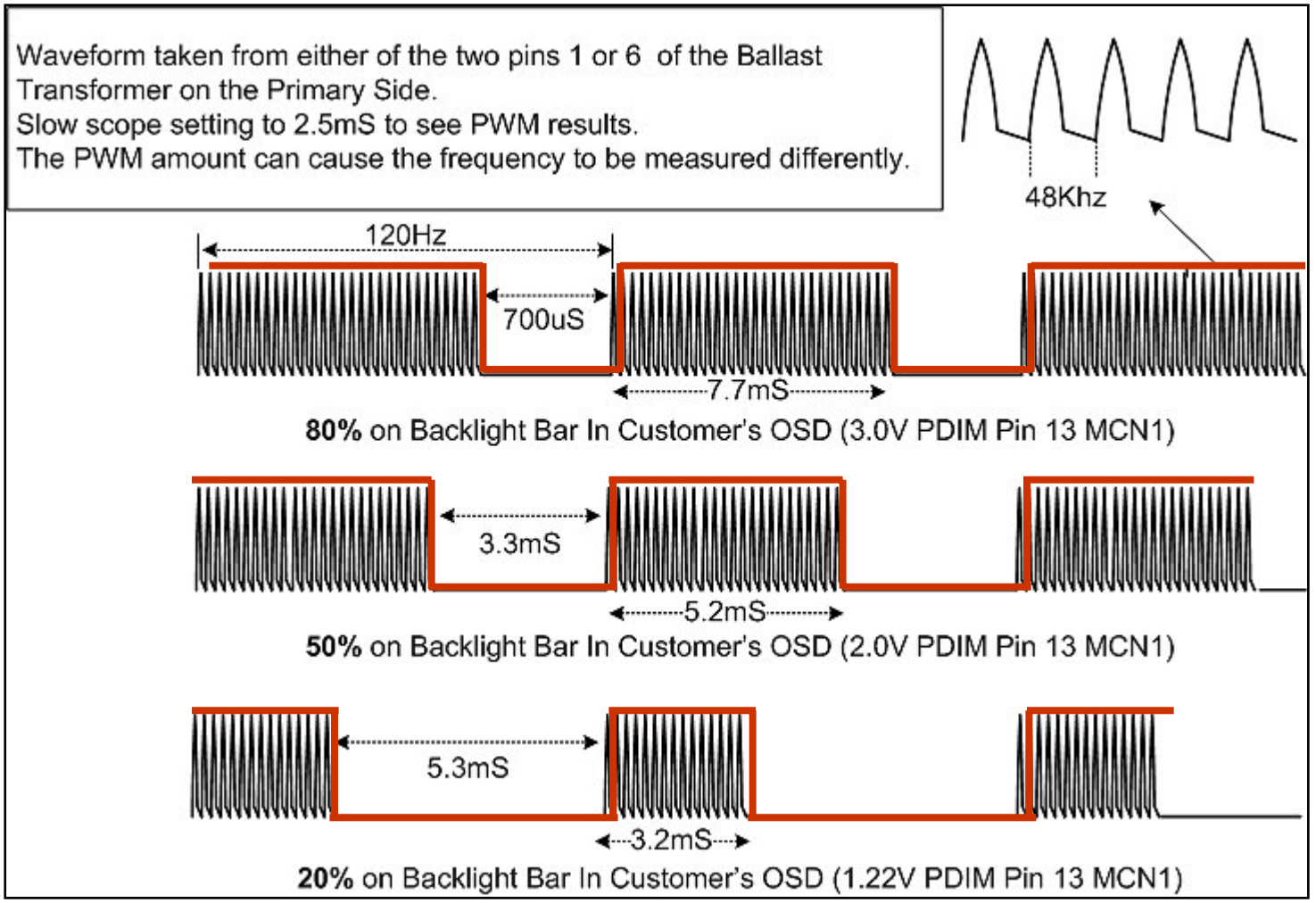
PWM-DIM (PWM Dimming) Manipulates the Backlight Brightness via Customer's OSD. Manipulates the Backlight Brightness via the video processor IC100. Darker Picture, Darker Backlights to facilitate improved Contrast Ratio. 0.6V ~ 3.3V Range

VBR-A (Analog Diming) Manipulates the Backlight Brightness as well. But this line is not used.

Backlight Drive Signal Dimming Signal Effects

PWMDIM manipulates the Burst Triangle Oscillator in the ballast drive IC.

ADIM also manipulates the Burst Triangle Oscillator But it is not used.


Waveform taken from either of the two pins 1 or 6 of the Ballast Transformer on the Primary Side.
Slow scope setting to 2.5mS to see PWM results.
The PWM amount can cause the frequency to be measured differently.
48Khz
120Hz
700uS
7.7mS
80% on Backlight Bar In Customer's OSD (3.0V PDIM Pin 13 MCN1)
3.3mS
5.2mS
50% on Backlight Bar In Customer's OSD (2.0V PDIM Pin 13 MCN1)
5.3mS
3.2mS
20% on Backlight Bar In Customer's OSD (1.22V PDIM Pin 13 MCN1)

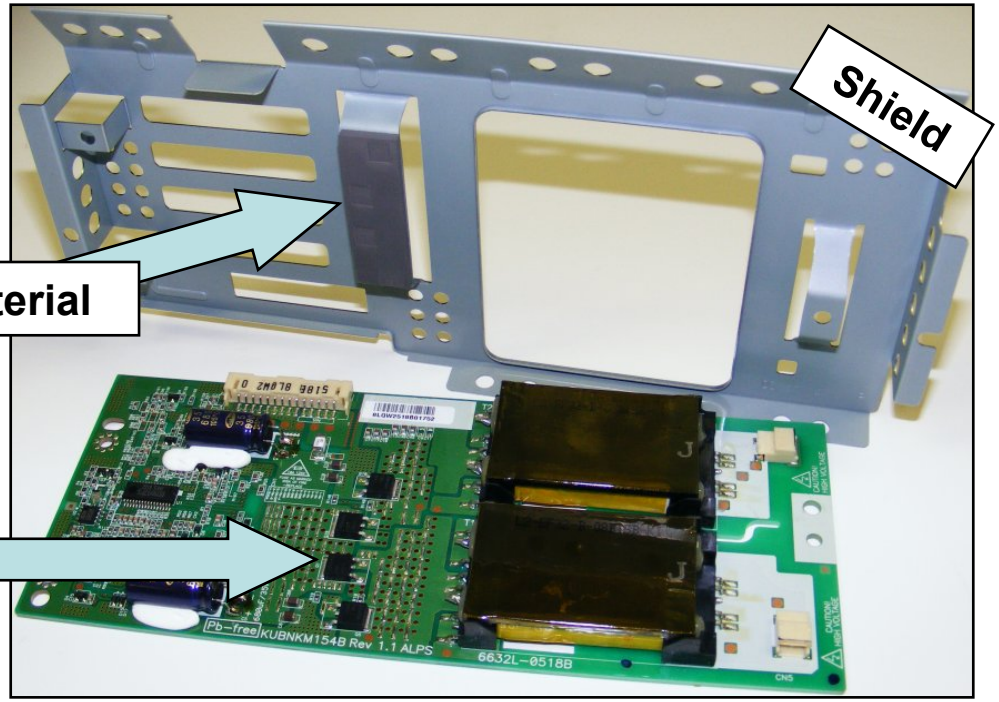
Ballast Removal (Heat Sink and Insulators)

Do not Run the Ballast with Shield Removed.

Heat Transfer Material

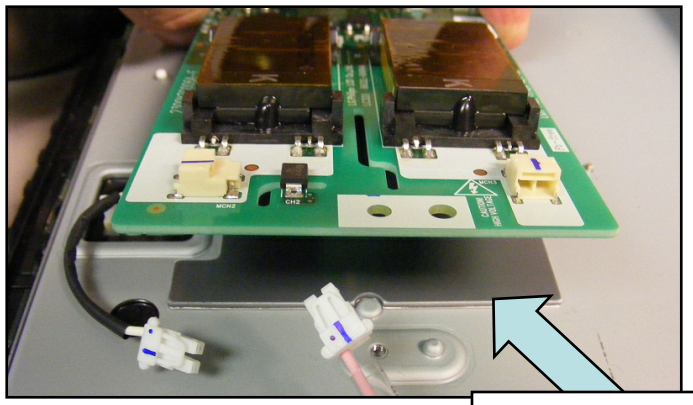
p/n EAY60713901

Protects the Output FETs



Do not Run the Ballast with Shield Removed.

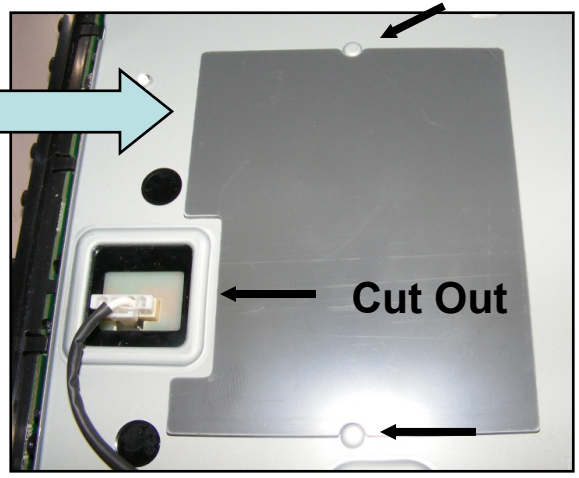
Be sure to replace "All" heat sink materials and insulators.



Insulator

Alignment Notch

Insulator



Alignment Notch

Ballast Connector CN1 Voltage and Diode Check

CN1 "Ballast" to P203 "SMPS"

Pin	Label	STBY	Run	Diode Check
1	VBL	0V	24.52V	Open
2	VBL	0V	24.52V	Open
3	VBL	0V	24.52V	Open
4	VBL	0V	24.52V	Open
5	VBL	0V	24.52V	Open
6	Gnd	Gnd	Gnd	Gnd
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	Gnd	Gnd	Gnd	Gnd
10	Gnd	Gnd	Gnd	Gnd
11	VBR_A	0V	1.67V	Open
12	On/Off	0V	3.45V	Open
13	VBR_B	0V	3.40V	Open
14	Error	0V	0V	Open

Diode Check taken with meter in Diode Mode with all Connectors Removed

LCD Controller Board

The T-Con IC UC1 receives from the Main Board LVDS at CN1 12 Bit LVDS Signals (Video) which it processes into TFT Drive Signals which through connectors CN3 and CN4 controls the LCD Panel.

12V is supplied to the T-Con Board on connector CN1 from the Main Board (Easily measured at fuse F1 2A and 125V).

There are two DC to DC converters that create
(17V developed at the cathode of D8).
(3.3V developed at the cathode of D9). Protected by Fuses FL3 and FL4.

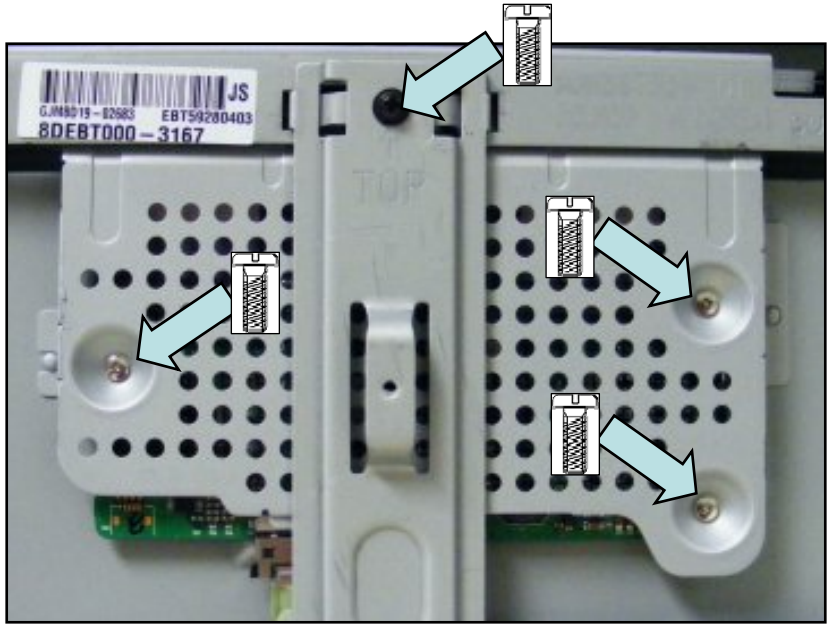
The 3.3V can also be measured at the ribbon connectors delivering signals to the TFT panel
(CN3 pins 57, 58 or 59) and
(CN4 pins 2, 3 or 4).

Also at the Regulator US2 the 1.5V can be checked. Protected by Fuses FL1 and FL2.

T-CON (TFT Drive) PWB (With Shield)

LVDS (Video and 12V) from Main PWB

T-CON (TFT Drive) PWB Removal



Remove the 3 Screws in the T-CON shield and the 1 screw from the top of the vertical brace.

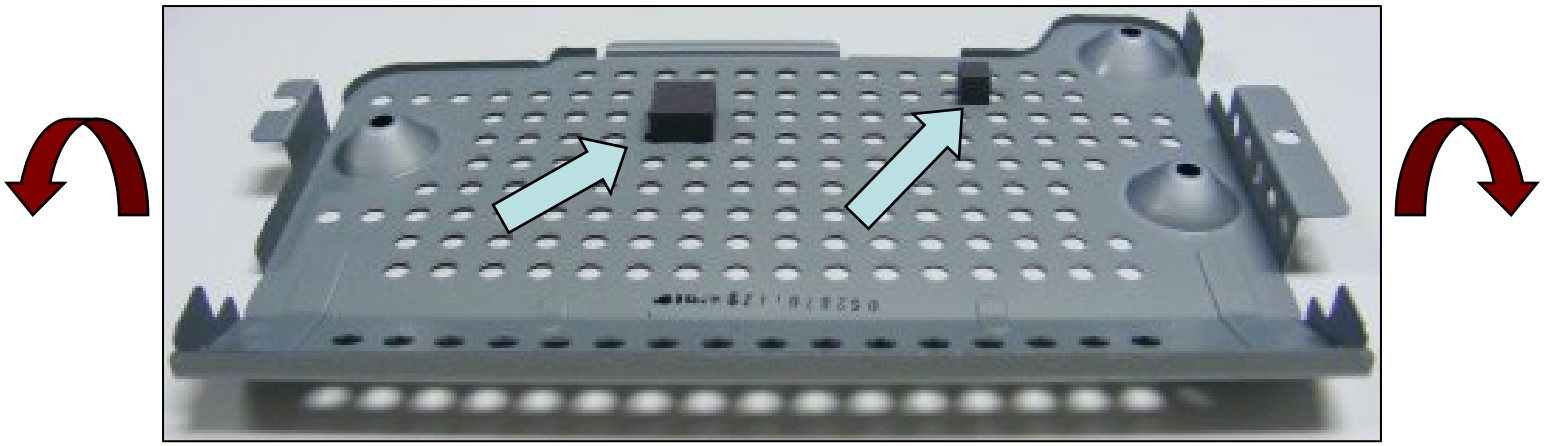
Remove the T-CON shield by sliding it left or right from under the vertical brace.

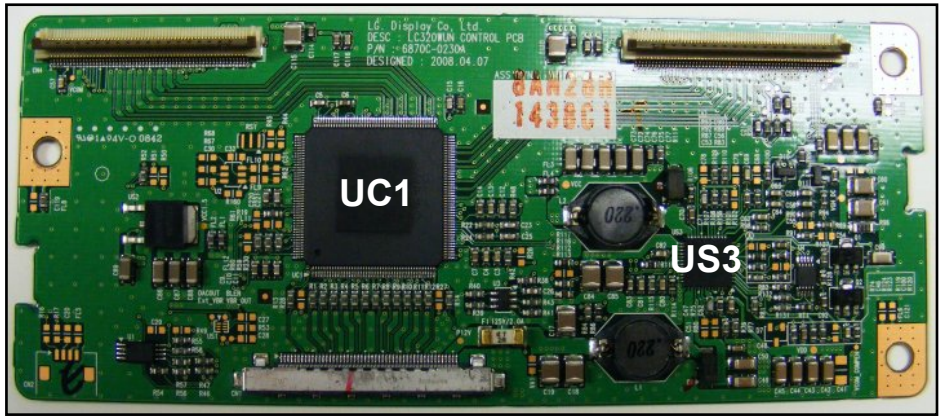
Disconnect CN3, CN4 and CN1.
See next slide for details.

Remember to reinstall the 3 screws for the Service Position if the T-CON board needs to be turned on for test purposes. These would already be removed when removing the shield.

T-CON Shield Removal Precautions (Chocolate Pieces) Heat Transfer.

**Note: There are Chocolate (Heat Transfer) material pieces underneath the T-CON Heat sink.
They dissipate heat from the UC1 and US3 ICs.
Be sure to return these pieces when reinstalling the Heat Sink (Shield).**





T-CON (TFT Drive) PWB Removal Continued

UNLOCKING CN3, CN4 and CN1

To remove the flex cables to the TFT Panel, CN3 or CN4: Place a soft thin object like a fingernail underneath the black locking tab and gently pull forward.
(Shown by the arrows in Fig 1)

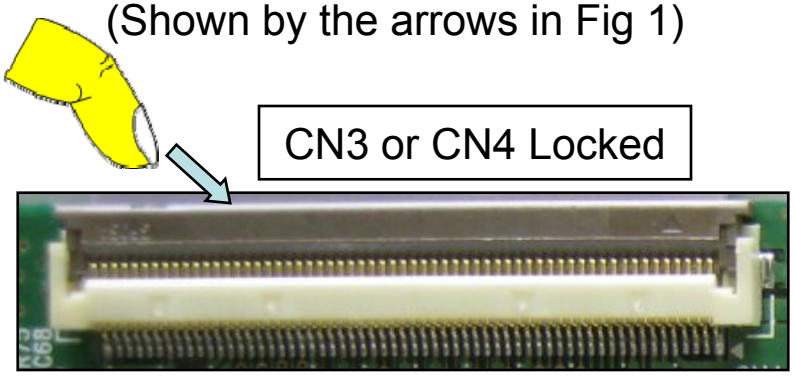


Fig 1

Flip the lock up and back from the flex cable. Then the flex cable can be easily removed.

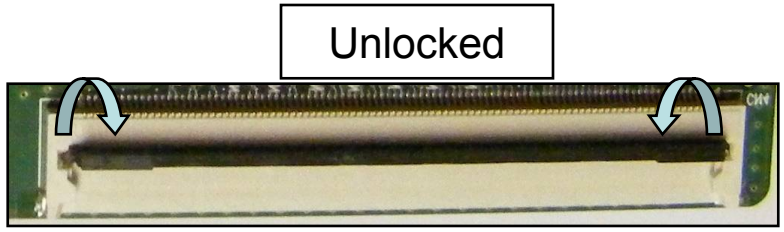
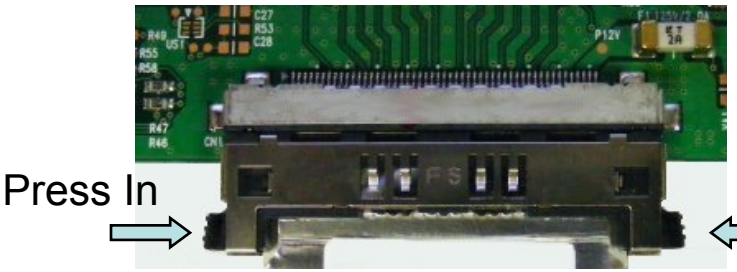


Fig 2

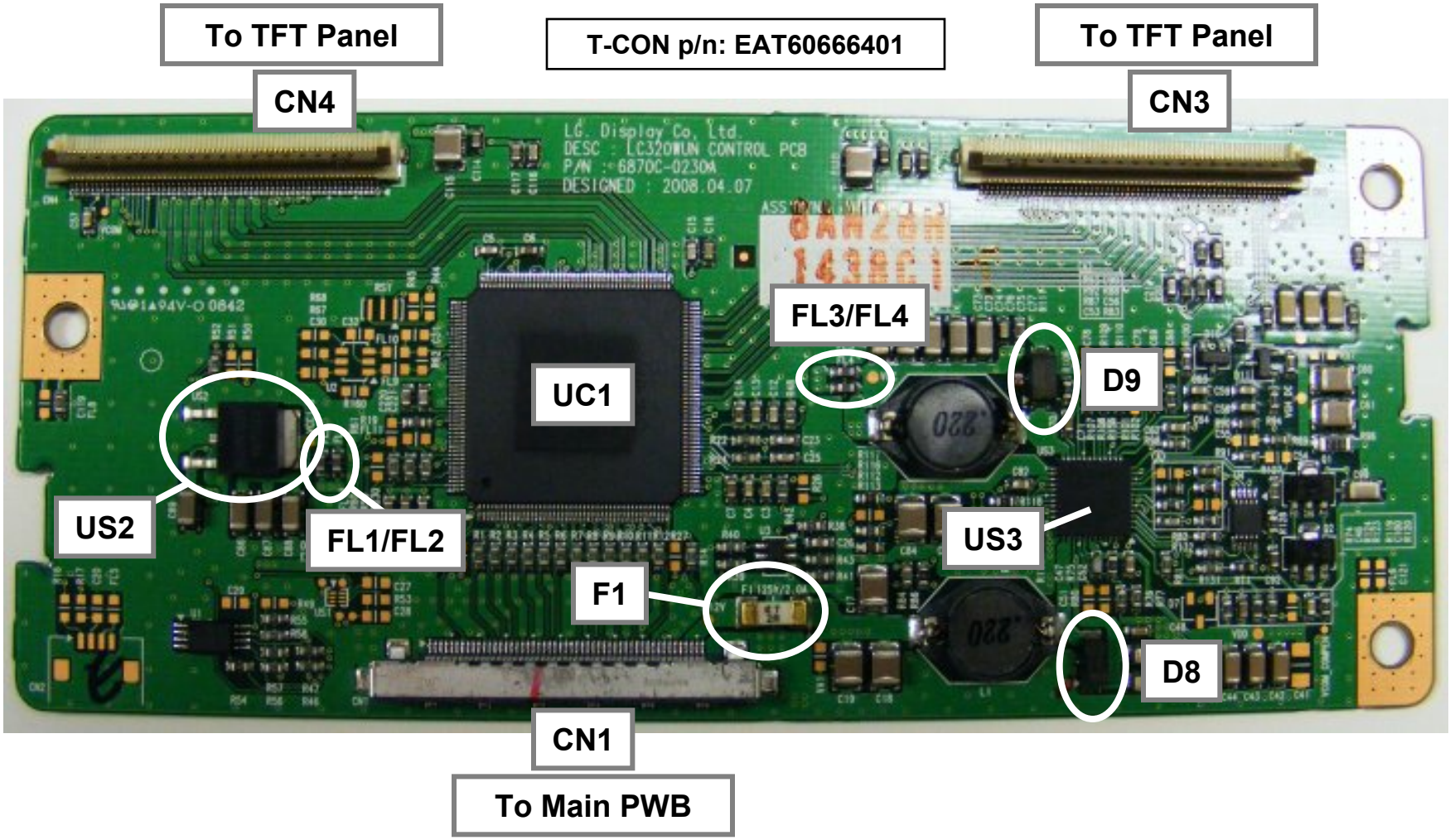
The locking tab is flipped upward

Fig 3 (CN1) LVDS



To remove the LVDS cable CN1;
Press in on the two tabs and slowly rock the cable out of the connector.
(Shown by the arrows in Fig 3)

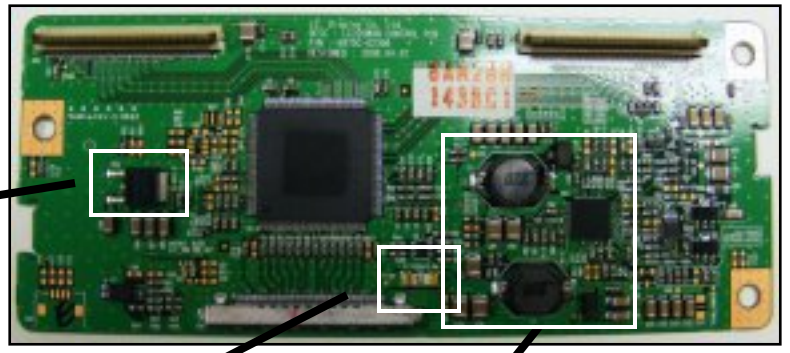
T-CON (TFT Drive) PWB (Shield Removed)



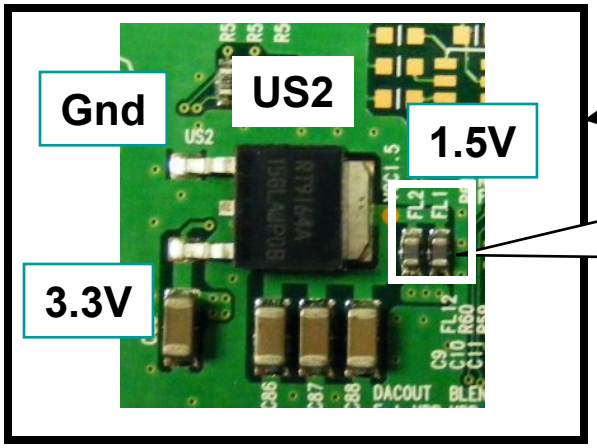
Remember to replace screws for ground purposes if testing the PWB.

T-CON (TFT Drive) PWB Checks

T-CON PWB (Locations)

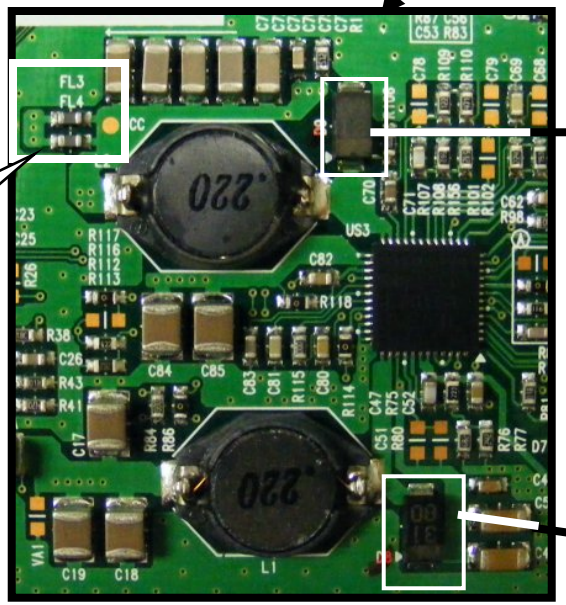


Check the Regulator US2 for Correct Voltage



Check 1.5V Fuses FL1 / FL2

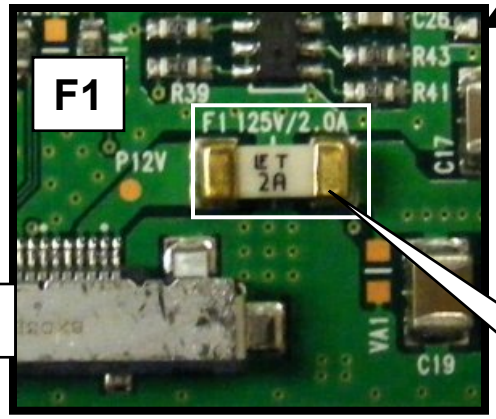
Black band indicates Cathode



Cathode 3.3V

Cathode 17V

Check 3.3V Fuses FL3 / FL4



Check Fuse F1 (12V)

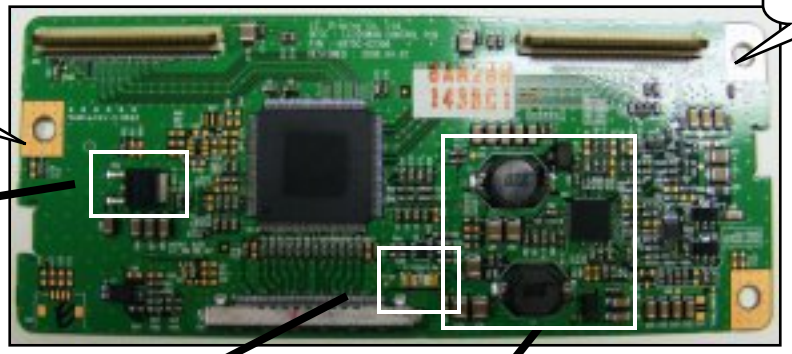
Check Fuse F1 for 12V from CN1 Pins 48, 49, 50, and 51.

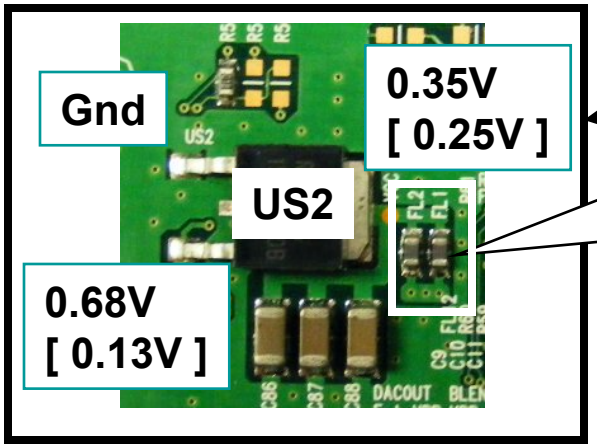
T-CON (TFT Drive) PWB Component Diode Checks

Diode Check taken with meter in Diode Mode with all Connectors Removed

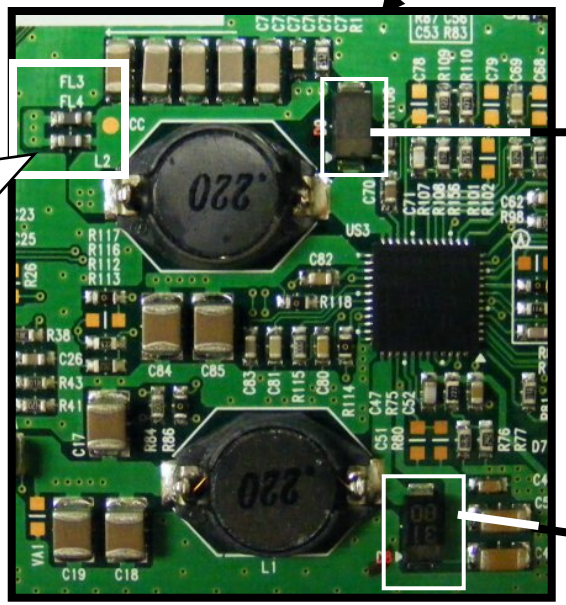
Meter in Diode Mode, black lead on Gnd lug.

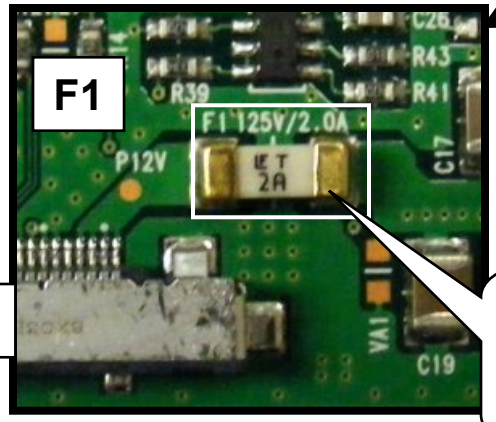
T-CON PWB (Locations)





Fuses
FL1 / FL2
0.35V
[0.25V]





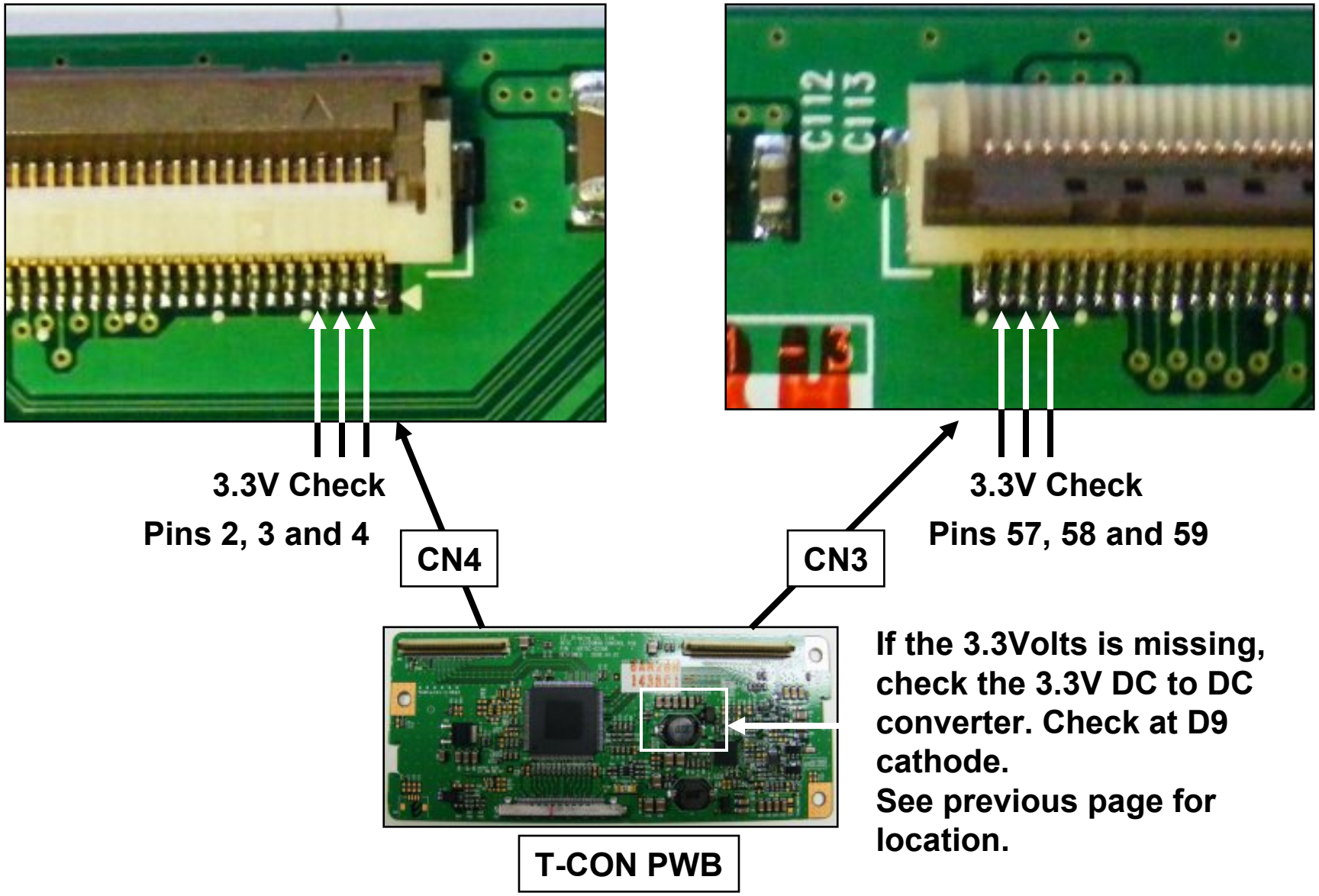
Fuses
FL3 / FL4
0.68V
[0.14V]

Fuse F1
3.18V
[0.57V]

(-) Reading in brackets [ ] on TP

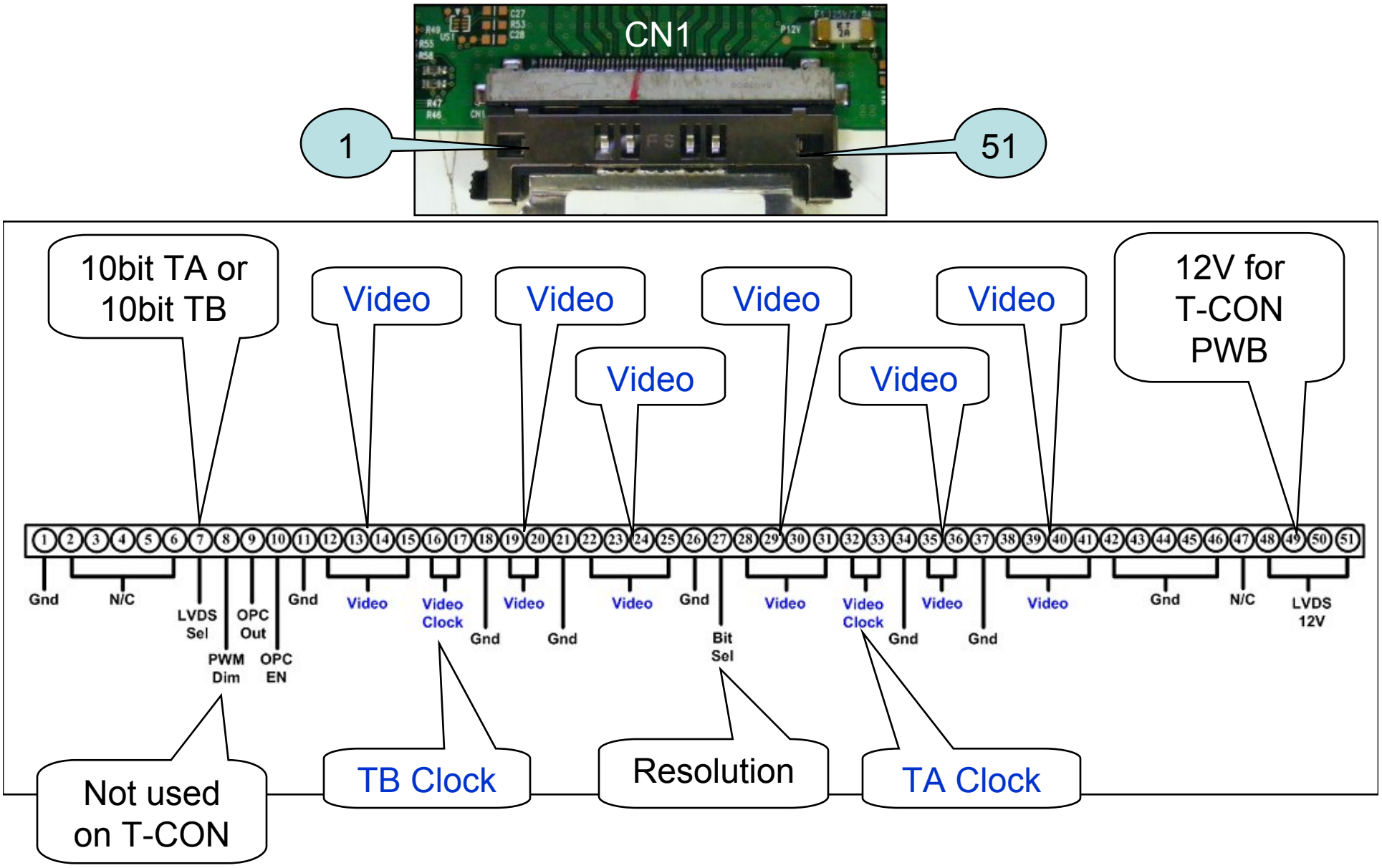
(+) Reading without brackets on TP

T-CON (TFT Driver) Board CN3 and CN4 (3.3V Voltage Check)



If the 3.3Volts is missing, check the 3.3V DC to DC converter. Check at D9 cathode.
See previous page for location.

Control PWB LVDS Connector CN1 Pin Identification



T-CON PWB Connector CN1 to Main PWB Voltage and Diode Check

Pins 1, 11, 18, 21, 26, 34, 37, 42~46 are all Ground
Pins 1~6 and 47 has No Connection

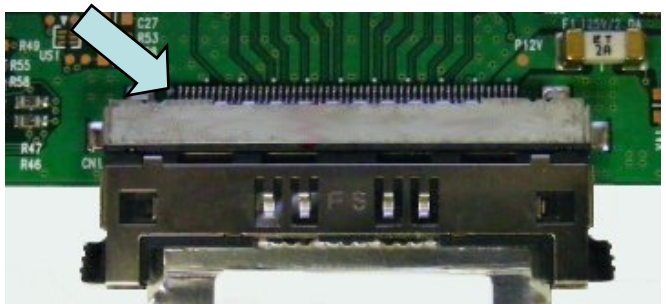
CN1 CONNECTOR "T-CON PWB" to P800 "Main"

7	**LVDS-SEL**	0V	0V	1.95V
8	**PWM-DIM**	0V	*0V	Open
9	**OPC-OUT**	0V	0V	1.75V
10	**OPC-EN**	0V	0V	1.75V
12	**TXA4+**	0V	1.2V	1.1V
13	**TXA4-**	0V	1.1V	1.1V
14	**TXA3+**	0V	1.2V	1.1V
15	**TXA3-**	0V	1.1V	1.1V
16	**TXA0+**	0V	1.1V	1.1V
17	**TXA0-**	0V	1.2V	1.1V
19	**TXA2+**	0V	1.2V	1.1V
20	**TXA2-**	0V	1.1V	1.1V
32	**TXA1+**	0V	1.2V	1.1V
23	**TXA1-**	0V	1.1V	1.1V
24	**TXA0+**	0V	1.1V	1.1V
25	**TXA0-**	0V	1.2V	1.1V

27	**BIT-SEL**	0V	3.24V	1.1V
29	**TXB4-**	0V	1.2V	1.1V
30	**TXB3+**	0V	1.2V	1.1V
31	**TXB3-**	0V	1.1V	1.1V
32	**TXBC+**	0V	1.1V	1.1V
33	**TXBC-**	0V	1.2V	1.1V
35	**TXB2+**	0V	1.1V	1.1V
36	**TXB2-**	0V	1.2V	1.1V
38	**TXB1+**	0V	1.1V	0.8V
39	**TXB1-**	0V	1.2V	1.1V
40	**TXB0+**	0V	1.1V	0.8V
41	**TXB0-**	0V	1.2V	1.1V
48	**LVDS 12V**	0V	12.1V	3.18V
49	**LVDS 12V**	0V	12.1V	3.18V
50	**LVDS 12V**	0V	12.1V	3.18V
51	**LVDS 12V**	0V	12.1V	Gnd

*Pin 8 PWM-DIM 3.15V (Max 100%) to 0.6V (Min 0%) Customer's Menu Backlight setting. But is Not Used by T-CON.

(See arrow on the T-CON PWB CN1 indicating pin 1)



Diode Check taken with meter in Diode Mode
with all Connectors Removed

Input Signal Processing

IC100 is the main Microprocessor and the main Signal Processor and is responsible for :

- ATSC, NTSC, and QAM reception and processing
- RS 232 service only Port (software upgrades and home theater environment).
- Wired Remote Port
- (1) Component Input Y, Pr, Pb and Audio L R
- (2) HDMI Inputs (back) (1) HDMI (Side Input)
- RGB PC and (PC Audio)
- USB (software upgrades using flash drive). USB located on the Rear.
- AV Composite (1 Rear and 1 Side Input)
- SIF and SAP

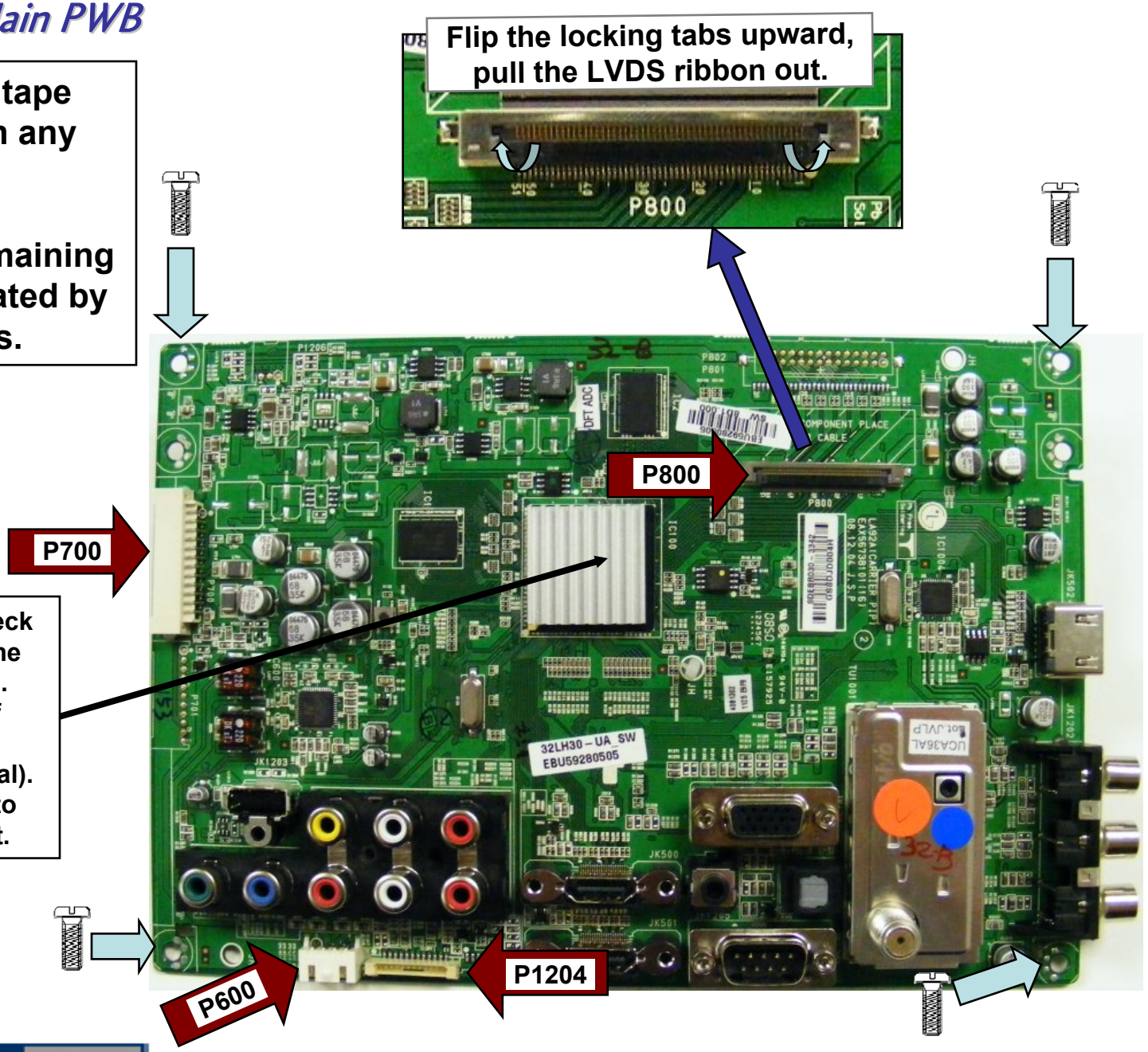
Output Signals

- 20 Bit LVDS (20 Pin) to the T-CON Board
- Audio output signals to the Speakers
- Digital Audio Output Coaxial and Optical
- ON OFF Controls to the SMPS turning on low voltage generation and Backlights
- Backlight intensity control signal (Digital Dimming) P-DIM sent to the Ballast through the SMPS.

Removing the Main PWB

Remove any tape holding down any cables.

Remove the remaining 4 screws indicated by the arrows.

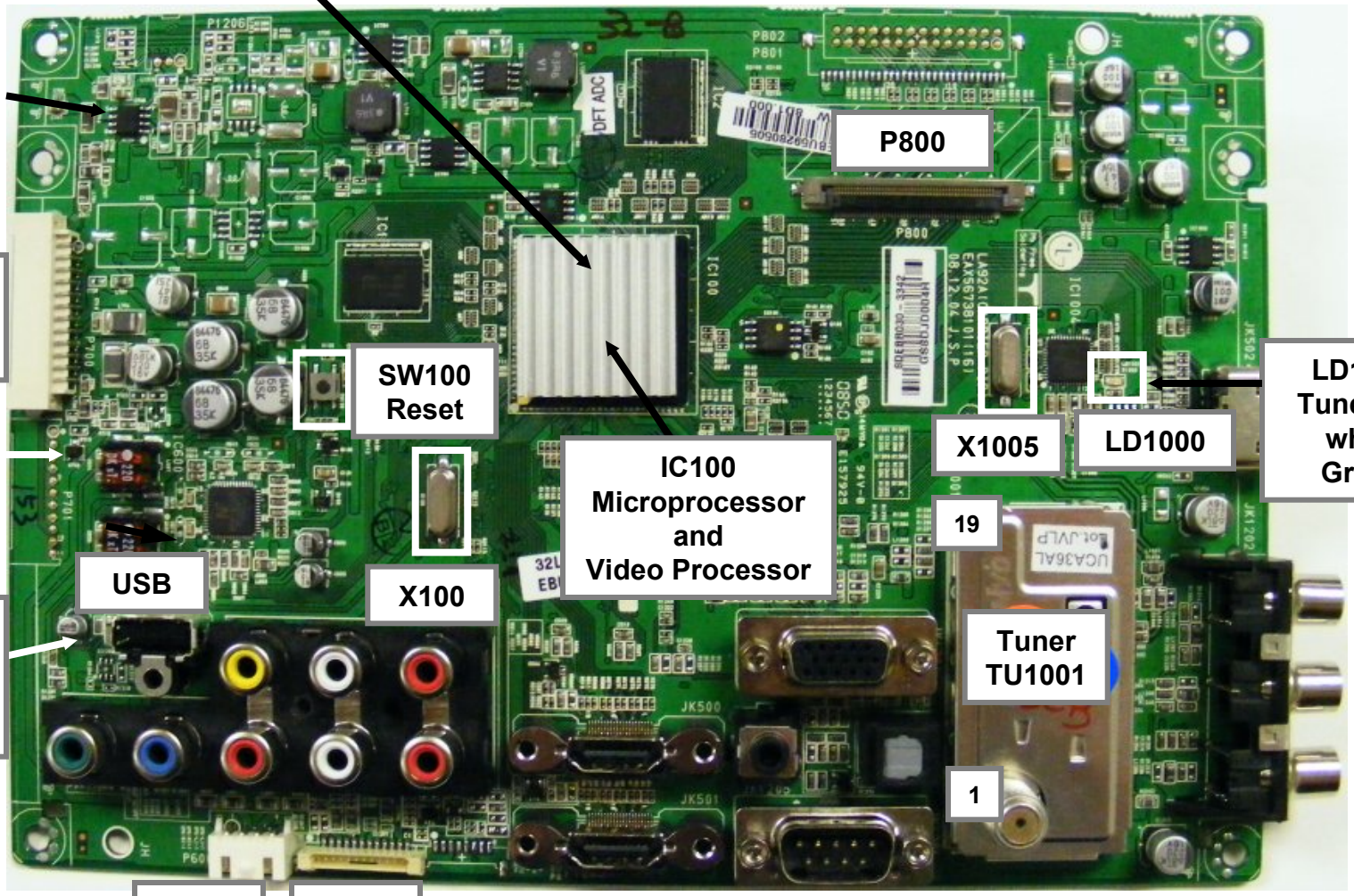


NOTE: Be sure to check on top and behind the Video Processor IC. Look for a piece of Chocolate (Heat Transfer Material). Be sure to transfer to new PWB if present.

Main PWB Layout

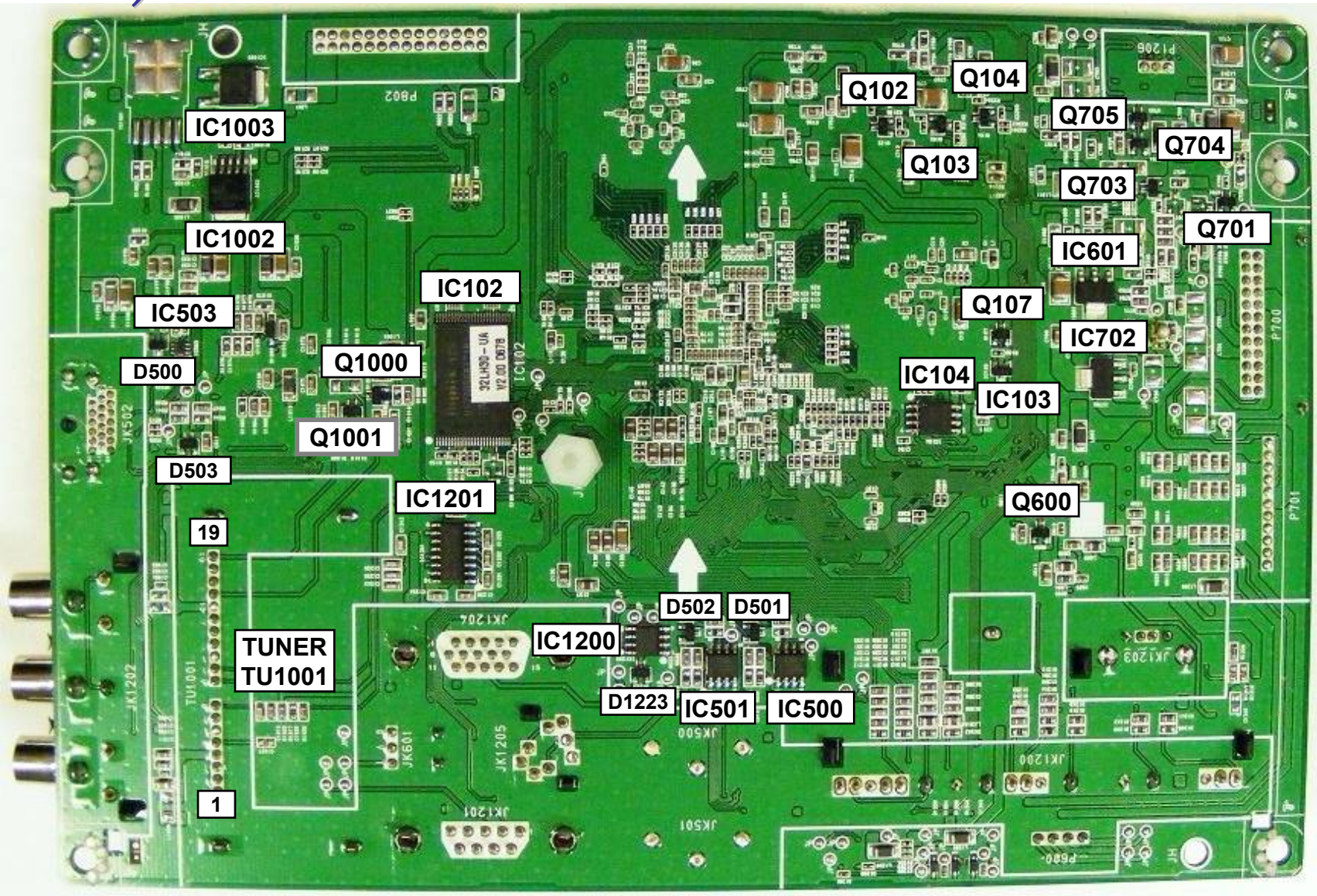
Look carefully on top and behind the Video Processor IC for Chocolate (Heat Transfer) material. Be sure to transfer to new PWB if replaced.

VIDEO PROCESSOR IC100 RUNS HOT, THIS IS NORMAL.

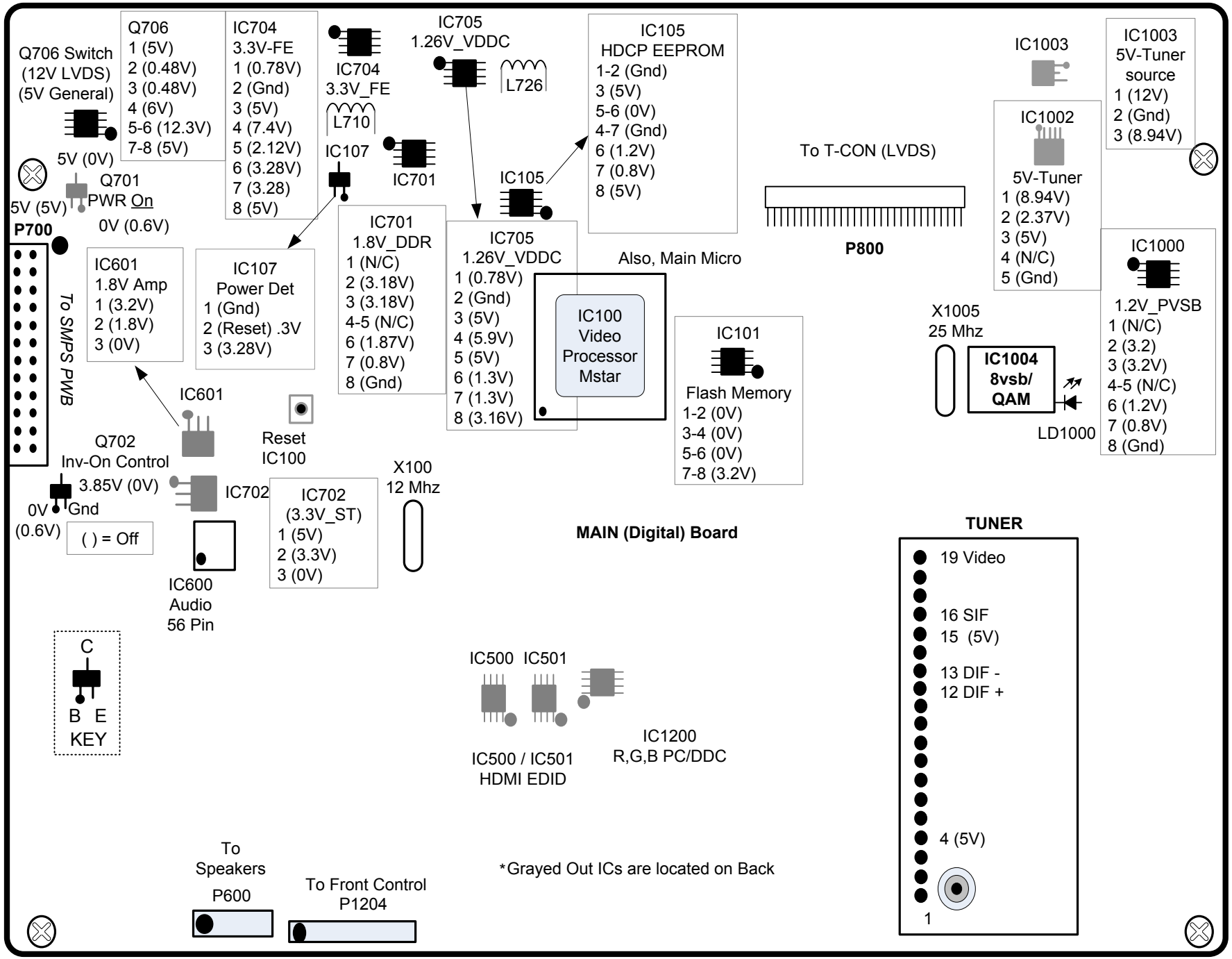


Main PWB (Back View)

Voltages given on the 11X17 foldout "Interconnect Diagram"

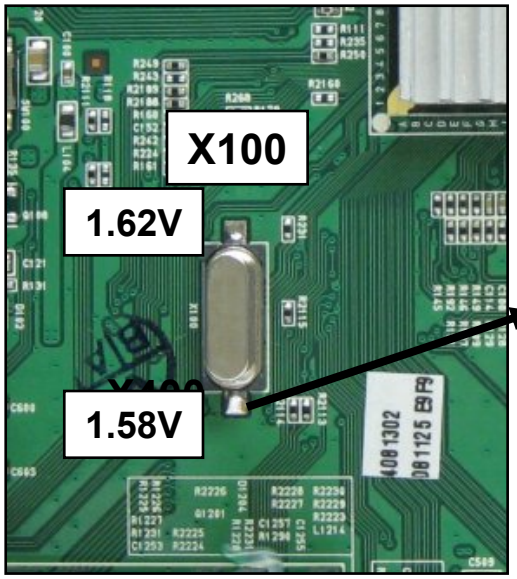


Main PWB Component Identification

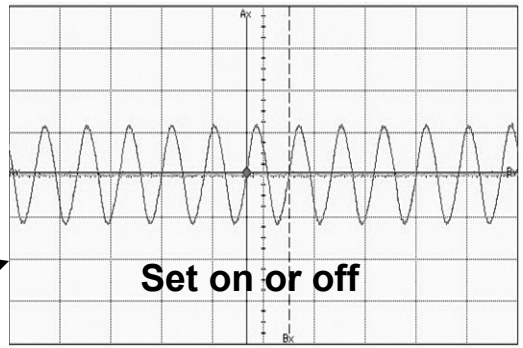


Main PWB X100 and X1005 Check

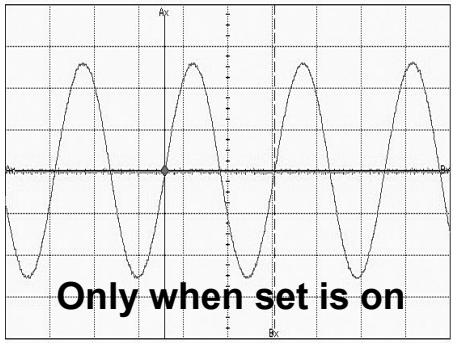
IC100 Microprocessor Crystal



2.28Vp/p
12Mhz

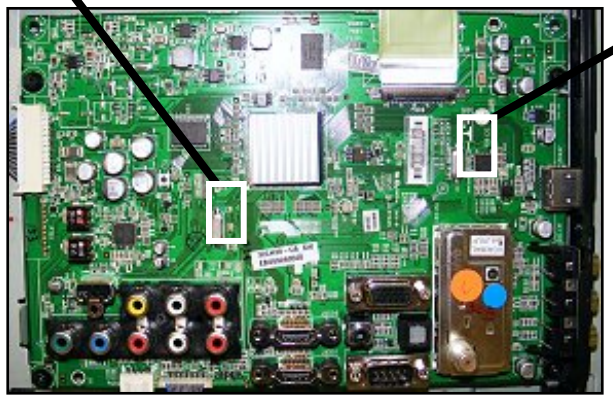


4.95Vp/p
25Mhz

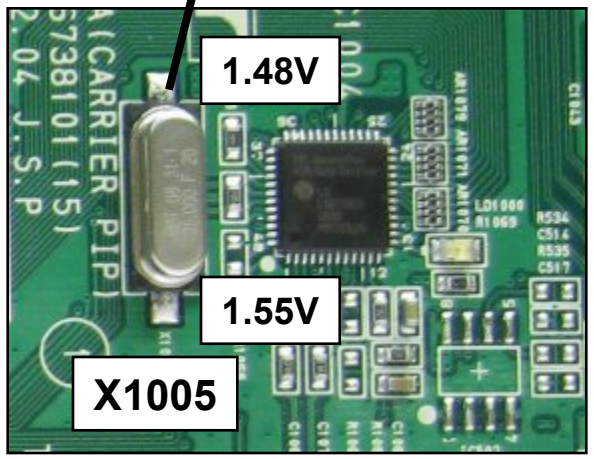


X100 Location

X1005 Location

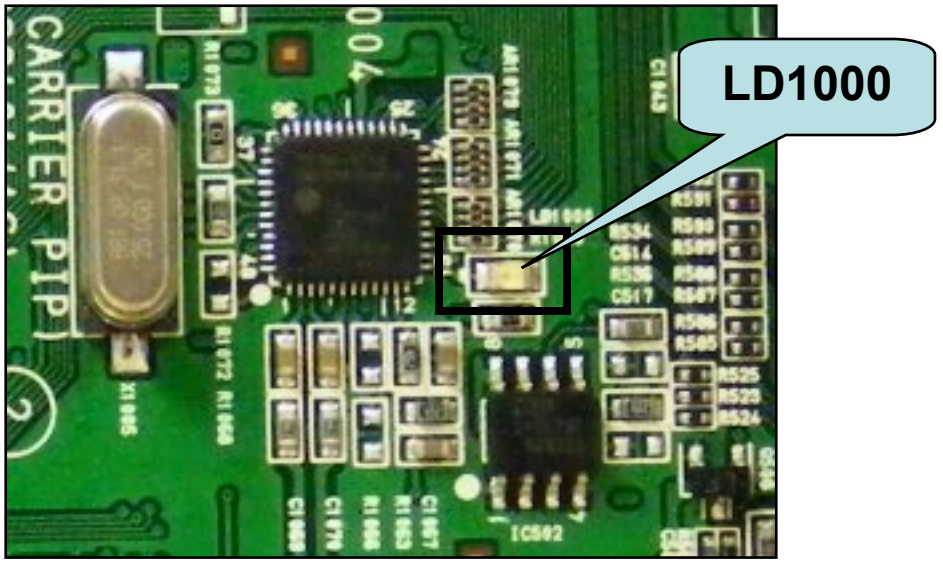


MAIN PWB



Crystal for Tuner Controller IC1004

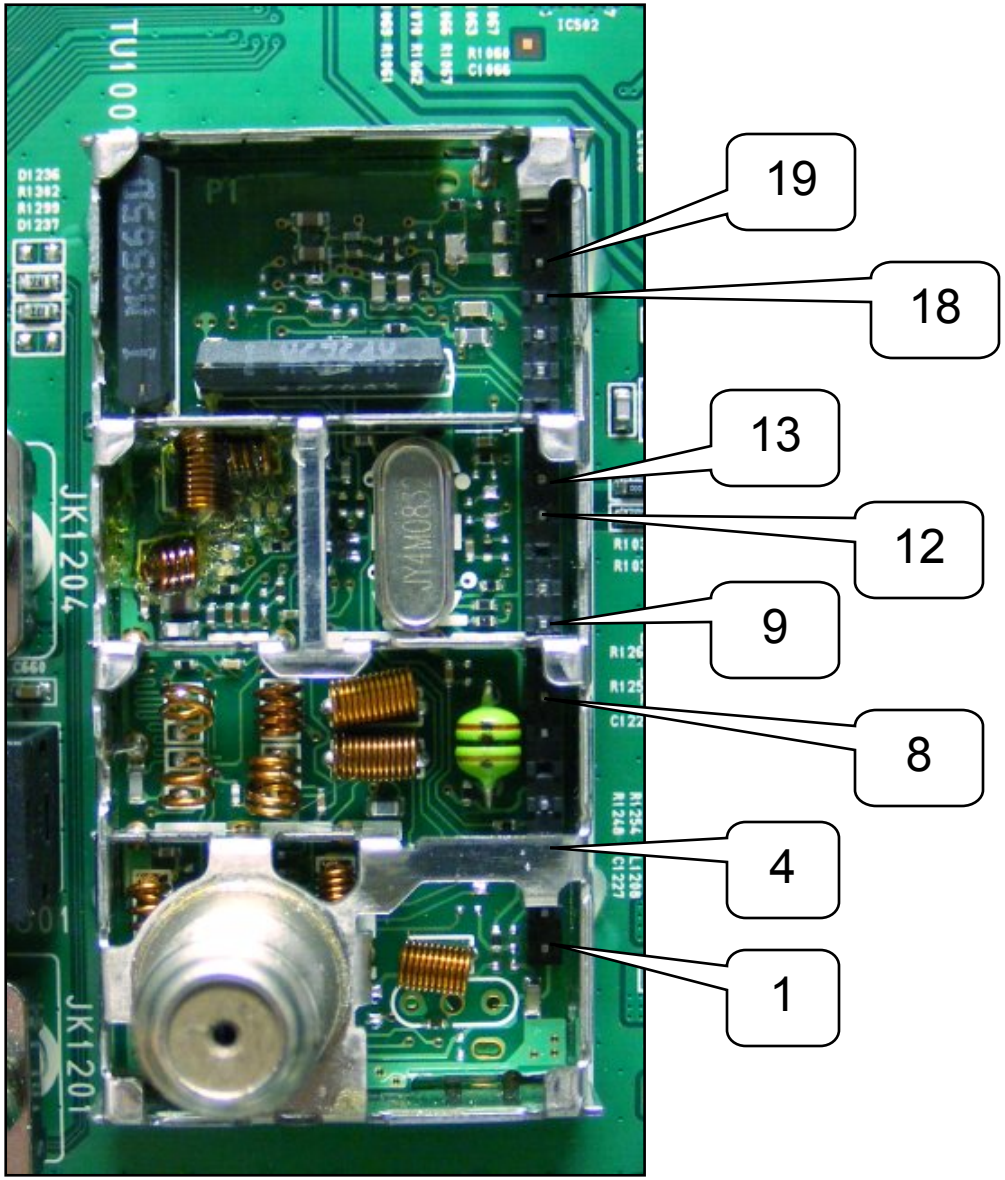
Main PWB LD1000 Function

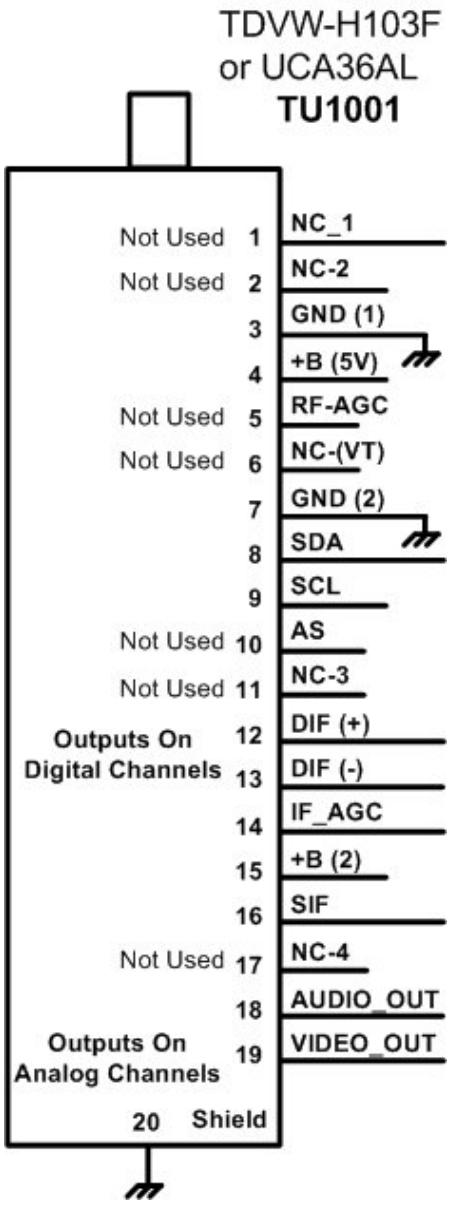


Main PWB
LD1000 Location

Use LD1000 as a visual aid.
This lets you know if the tuner internal PLL (Phase Locked Loop) system is locked.
Illuminated PLL is normal.
Off is abnormal tuner lock.

Main PWB Tuner with Shield Off (Pin ID)





Main PWB Tuner Video and SIF Output Check

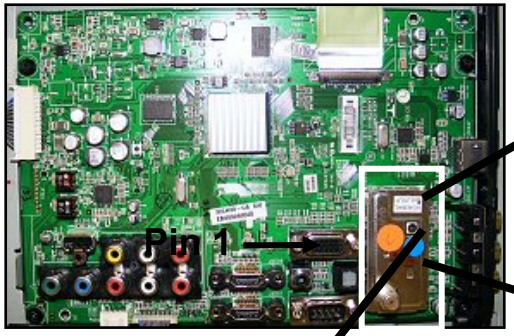
USING COLOR BAR SIGNAL INPUT

TDVW-H103F
or UCA36AL
TU1001

Possibility of two different tuners

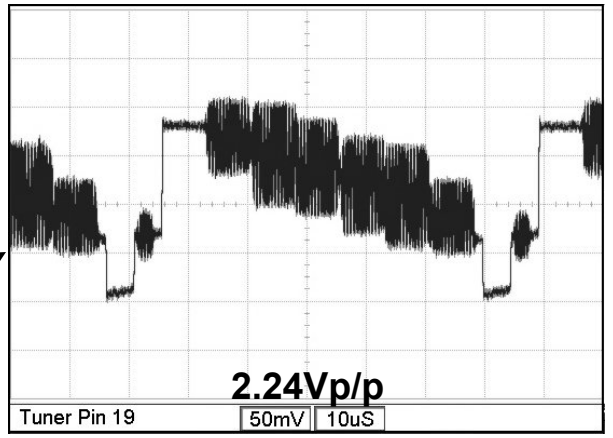
Not Used	1	NC_1
Not Used	2	NC-2
	3	GND (1)
	4	+B (5V)
Not Used	5	RF-AGC
Not Used	6	NC-(VT)
	7	GND (2)
	8	SDA
	9	SCL
Not Used	10	AS
Not Used	11	NC-3
Outputs On Digital Channels	12	DIF (+)
	13	DIF (-)
	14	IF_AGC
	15	+B (2)
	16	SIF
Not Used	17	NC-4
	18	AUDIO_OUT
Outputs On Analog Channels	19	VIDEO_OUT
	20	Shield

MAIN PWB Tuner Location

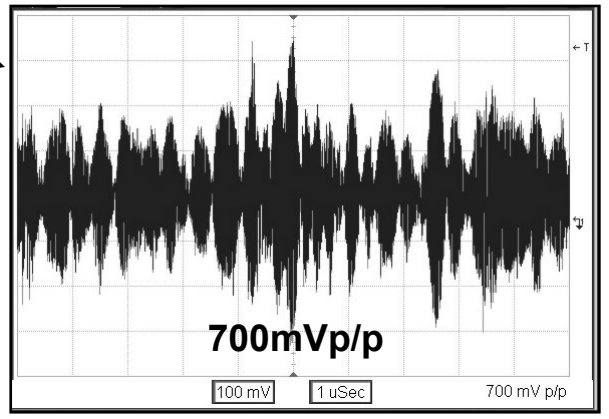


Pin 19 "Video" Signal

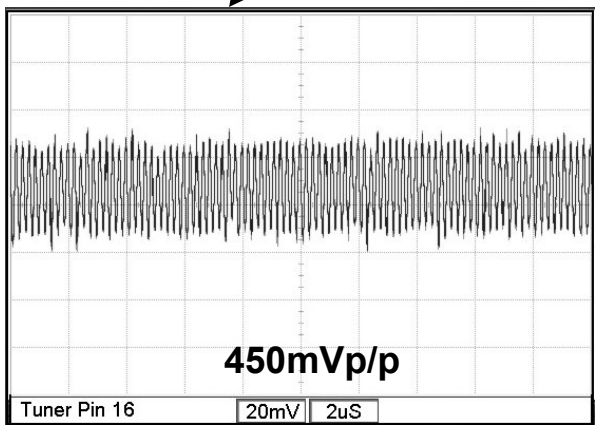
Note: "Video Out" Signal only when receiving an analog Channel.



Pin 12 and Pin 13 "Dig IF" Signal

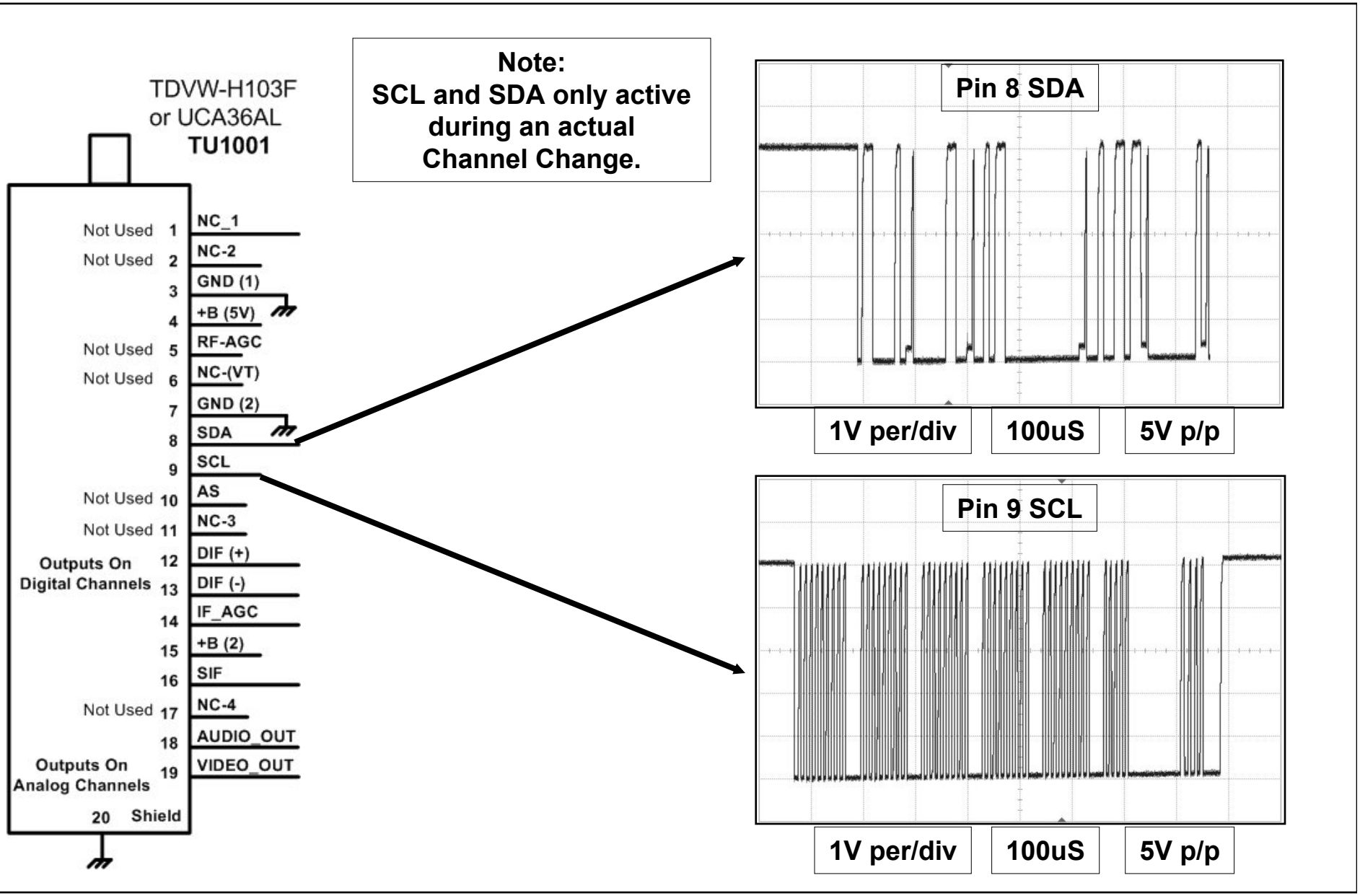


Pin 16 "SIF" Signal



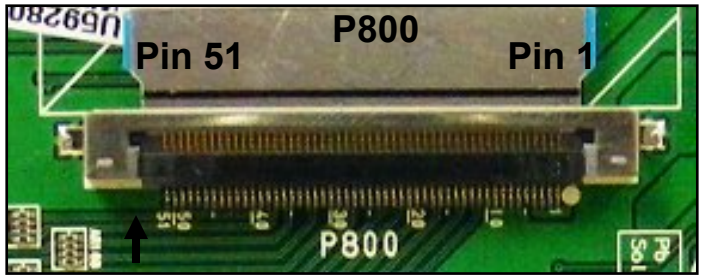
Note:
"Dig IF" Signal only when receiving a Digital Channel.

Main PWB Tuner Clock and Data Lines

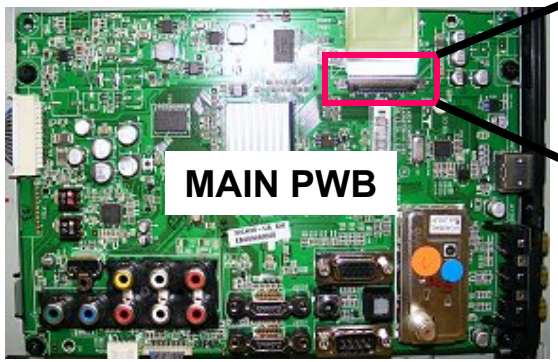


Main PWB LVDS P800 Video Output Check

To confirm that the Main PWB is outputting Picture Content signals, check P800 (LVDS) cable for output. Check pins 11-14,16-17, 19-24, 27-30, 32-33 and 35-40. Pins 35-36 carry the clock for TA and 19-20 carry the clock for TB. These signals vary from each other, but looking for signals like the ones shown below on any of these pins will confirm the output of video content. This signal is using standard SMTE Color Bar output from a generator as the input source.

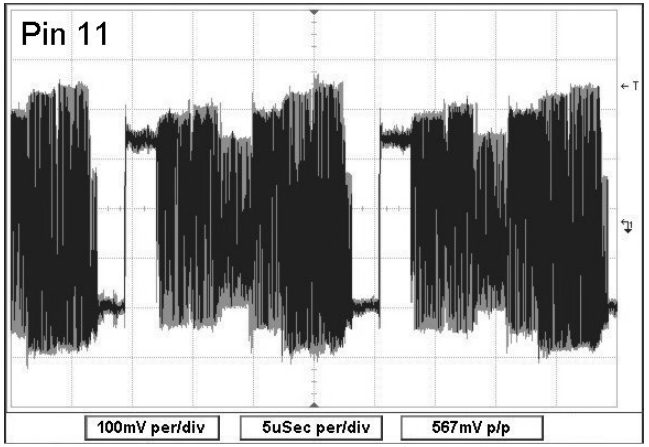


Pin 1, 2, 3, 4 (LVDS 12V)



P800 Location

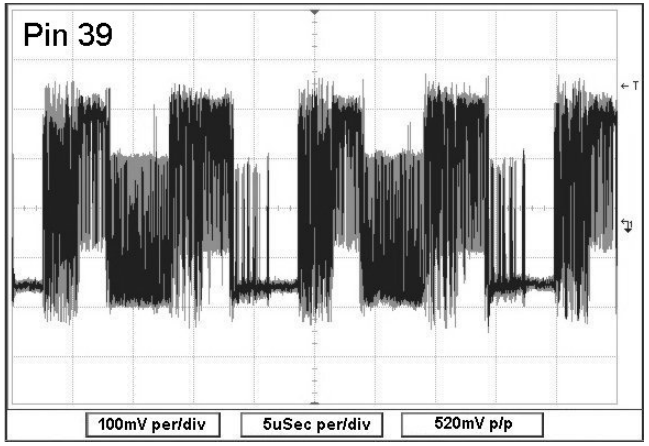
Pin 11



2uS

500nS

Pin 39

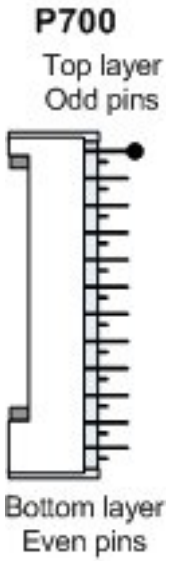


2uS

500nS

This is just a sample of two pins on the LVDS. There are 8 pins on P801 carrying video.

Main PWB Connector P700 to Power Supply Voltage and Diode Check



P700 "Main PWB" to P201 "SMPS PWB"

Odd Pins

Pin	Label	STBY	Run	Diode Check
1	nc	nc	nc	Open
3	Gnd	Gnd	Gnd	Gnd
5	Gnd	Gnd	Gnd	Gnd
7	5.2V	5.14V	5.14V	1.5V
9	5.2V	5.14V	5.14V	1.5V
11	Gnd	Gnd	Gnd	Gnd
13	12V	0V	12.3V	Open
15	Gnd	Gnd	Gnd	Gnd
17	24V	0V	24.8V	Open
19	nc	nc	nc	Open
21	[1]BR1	0V	1.65V	Open
23	nc	nc	nc	Open

Even Pins

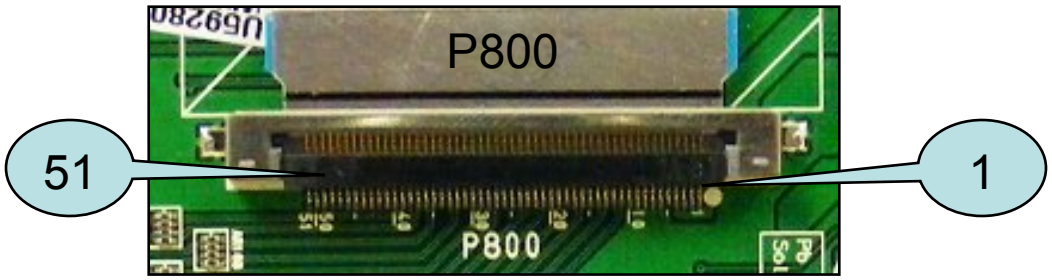
Pin	Label	STBY	Run	Diode Check
2	PWR-ON	0V	4.99V	2.8V
4	Gnd	Gnd	Gnd	Gnd
6	Gnd	Gnd	Gnd	Gnd
8	5.2V	5.14V	5.14V	1.5V
10	5.2V	5.14V	5.14V	1.5V
12	Gnd	Gnd	Gnd	Gnd
14	12V	0V	12.3V	Open
16	Gnd	Gnd	Gnd	Gnd
18	24V	0V	24.8V	Open
20	INV ON	0V	4.67V	3.17V
22	Err Out	0V	0V	Gnd
24	[2]PWM-DIM	0V	3.2V	1.33V

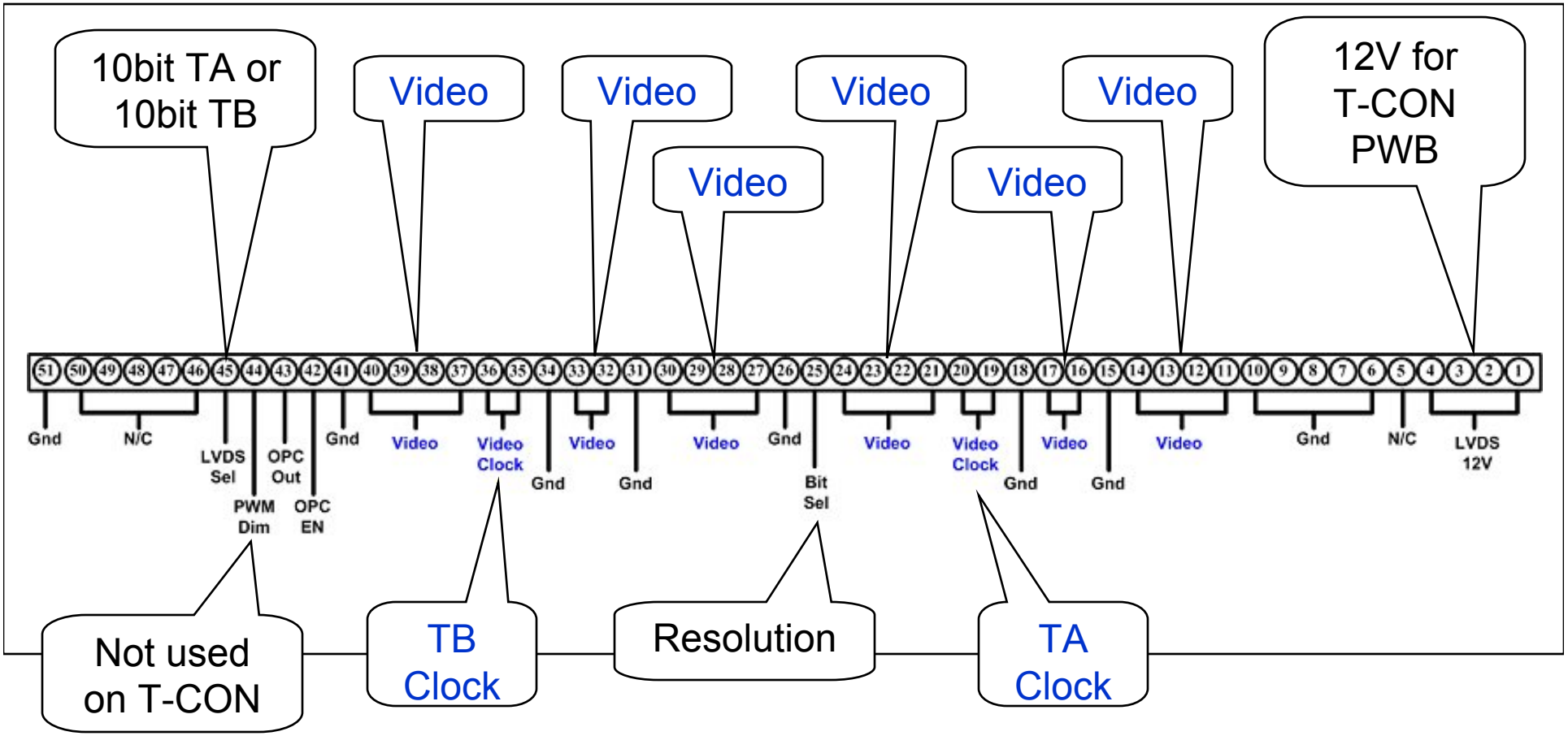
[1]BR1 (A-DIM) Pin 21 Fixed and not used

[2]PDIM Pin 24 can vary according to type of signal being processed, OSD Backlight setting. 0.6V 0% to 3.3V 100% and the Intelligent Sensor. Output from the video processor chip.

Diode Check taken with meter in Diode Mode with all Connectors Removed

Main PWB LVDS Connector P800 Pin Identification





Main PWB Connector P800 to T-CON Voltage and Diode Check

Diode Check taken with meter in Diode Mode with all Connectors Removed

Pins 6~10, 15, 18, 26, 31, 34, 41, 51 all Ground

P800 "Main" CONNECTOR to CN1 "T-CON PWB“

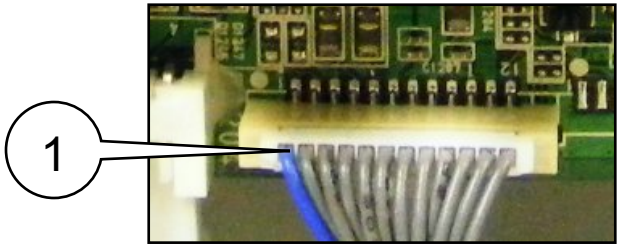
1	**LVDS 12V**	0V	12.1V	Gnd
2	**LVDS 12V**	0V	12.1V	3.18V
3	**LVDS 12V**	0V	12.1V	3.18V
4	**LVDS 12V**	0V	12.1V	3.18V
5, 46~50	**N/C**	n/c	n/c	n/c
11	**TXB0-**	0V	1.2V	1.1V
12	**TXB0+**	0V	1.1V	0.8V
13	**TXB1-**	0V	1.2V	1.1V
14	**TXB1+**	0V	1.1V	0.8V
16	**TXB2-**	0V	1.2V	1.1V
17	**TXB2+**	0V	1.1V	1.1V
19	**TXBC-**	0V	1.2V	1.1V
20	**TXBC+**	0V	1.1V	1.1V
21	**TXB3-**	0V	1.1V	1.1V
22	**TXB3+**	0V	1.2V	1.1V
23	**TXB4-**	0V	1.2V	1.1V
25	**BIT-SEL**	0V	3.24V	1.1V

27	**TXA0-**	0V	1.2V	1.1V
28	**TXA0+**	0V	1.1V	1.1V
29	**TXA1-**	0V	1.1V	1.1V
30	**TXA1+**	0V	1.2V	1.1V
32	**TXA2-**	0V	1.1V	1.1V
33	**TXA2+**	0V	1.2V	1.1V
35	**TXA0-**	0V	1.2V	1.1V
36	**TXA0+**	0V	1.1V	1.1V
37	**TXA3-**	0V	1.1V	1.1V
38	**TXA3+**	0V	1.2V	1.1V
39	**TXA4-**	0V	1.1V	1.1V
40	**TXA4+**	0V	1.2V	1.1V
42	**OPC-EN**	0V	0V	1.75V
43	**OPC-OUT**	0V	0V	1.75V
44	**PWM-DIM**	0V	*0V	Open
45	**LVDS-SEL**	0V	0V	1.95V

*Pin 44 PWM-DIM 3.15V (Max 100%) to 0.6V (Min 0%) Customer’s Menu Backlight setting. But is Not Used by T-CON.

(See arrow on the T-CON PWB CN1 indicating pin 1)

Main PWB Connector P1204 to (Ft. IR/LED Control) Voltage and Diode Check

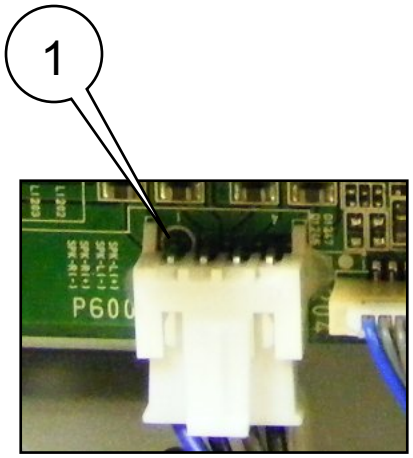


P1204 CONNECTOR "MAIN PWB" to P1 "Front IR / LED PWB Assy"

Pin	Label	STBY	Run	Diode Check
1	**SCL**	3.3V	3.3V	Open
2	**SDA**	3.3V	3.3V	1.67V
3	**Gnd**	Gnd	Gnd	Gnd
4	**Key1**	3.3V	3.3V	1.4V
5	**Key2**	3.3V	3.3V	1.1V
6	**5V ST**	5.1V	5.1V	1.5V
7	**Gnd**	Gnd	Gnd	Gnd
8	**Gnd**	Gnd	Gnd	Gnd
9	**IR**	4.8V	4.8V	Open
10	**Gnd**	Gnd	Gnd	Gnd
11	**3.3V_ST**	3.29V	3.29V	0.76V
12	**POWER On/Off**	0V	3.29V	Open

Diode Check taken with meter in Diode Mode with all Connectors Removed

Main PWB Connector P600 to Speakers Voltage and Diode Check



P600 CONNECTOR "Main" to "Speakers"

Pin	LABEL	SBY	Run	Diode Check
1	SPK-R(-)	0V	10.7V	2.6V
2	SPK-R(+)	0V	10.7V	2.6V
3	SPK-L(-)	0V	10.7V	2.6V
4	SPK-L(+)	0V	10.7V	2.6V

Use speaker out to test for defective Audio Amp IC600

Diode Check taken with meter in Diode Mode with all Connectors Removed

FRONT IR AND KEY BOARD SECTION

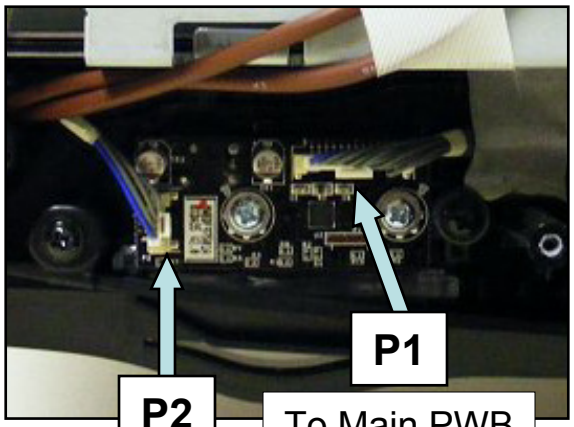
The Front IR board contains the Infrared receiver and the Power LEDs.

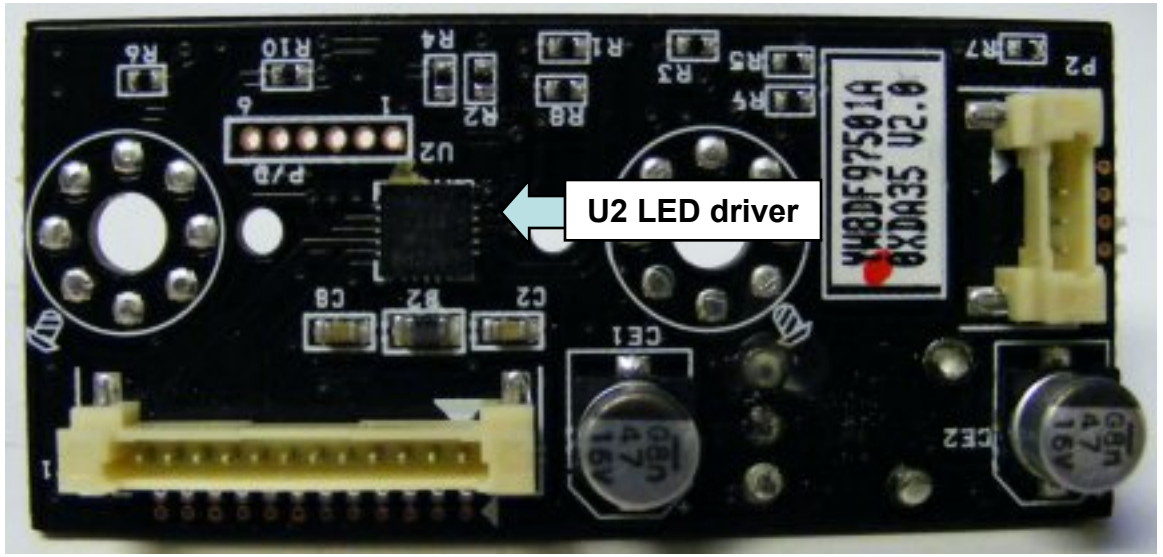
This board receives its B+ (STBY5V) from the Main PWB. It also has connections to the side Key board. The 3.3V pull up for the keys is routed from the Main board through the Front IR board to the Side Key board.

The Front Power LEDs pulsate or appear to move. This is accomplished using multiple LEDs and a driver IC U2 which communicates with the Main board via Clock and Data lines.

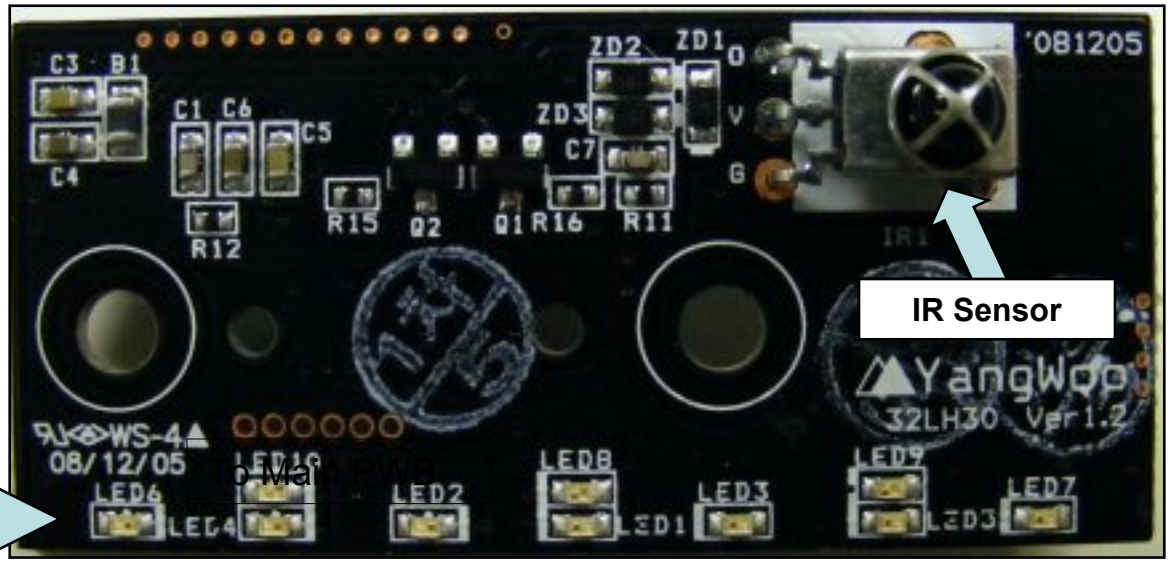
There are several Zener diodes on the board as well and since it receives STAND-BY 5V (STBY 5V) it could make the Power Supply or the Main board appear to be defective if a short was introduced to the stand by line.

Front PWB Assembly (IR and Power LED) Layout (Front and Back View)





Note: STBY5V is routed to this board. Possibility of a short.



Front IR/LED Control Connector P1 and P2 to Main Voltage and Diode Check

P1 Connector "IR/LED Control PWB" to "MAIN PWB" P404

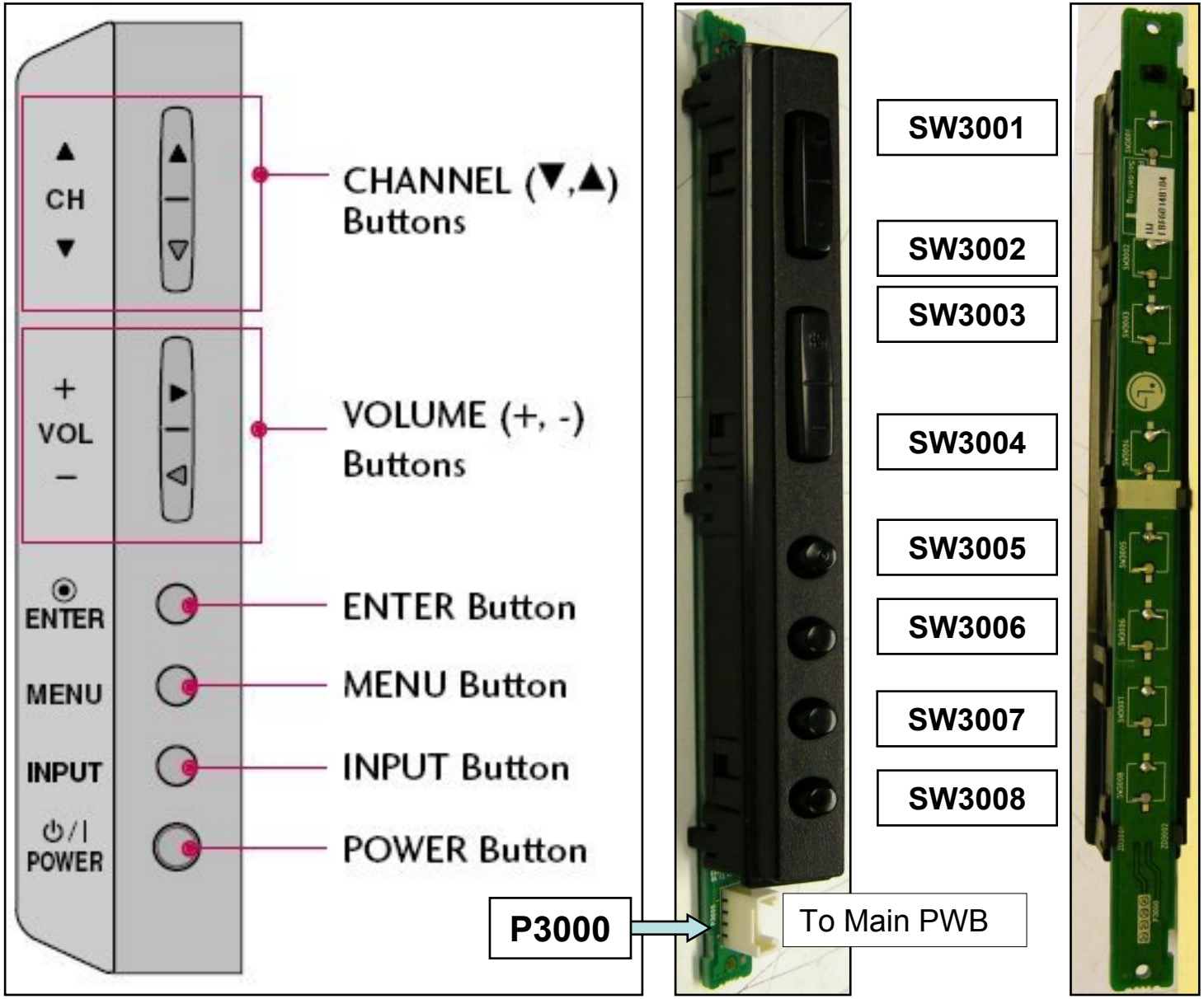
Pin	LABEL	STBY	Run	Diode Check
1	SCL	3.3V	3.3V	2.8V
2	SDA	3.3V	3.3V	2.8V
3	Gnd	Gnd	Gnd	Gnd
4	Key1	3.3V	3.3V	Open
5	Key2	3.3V	3.3V	Open
6	5V ST	5.1V	5.1V	2V
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	2.41V
9	IR	4.8V	4.8V	2.5V
10	Gnd	Gnd	Gnd	Gnd
11	3.3V_ST	3.29V	3.29V	Open
12	POWER On/Off	0V	3.29V	2.2V

P2 Connector "IR/LED Control PWB" to "Side Key" P3000

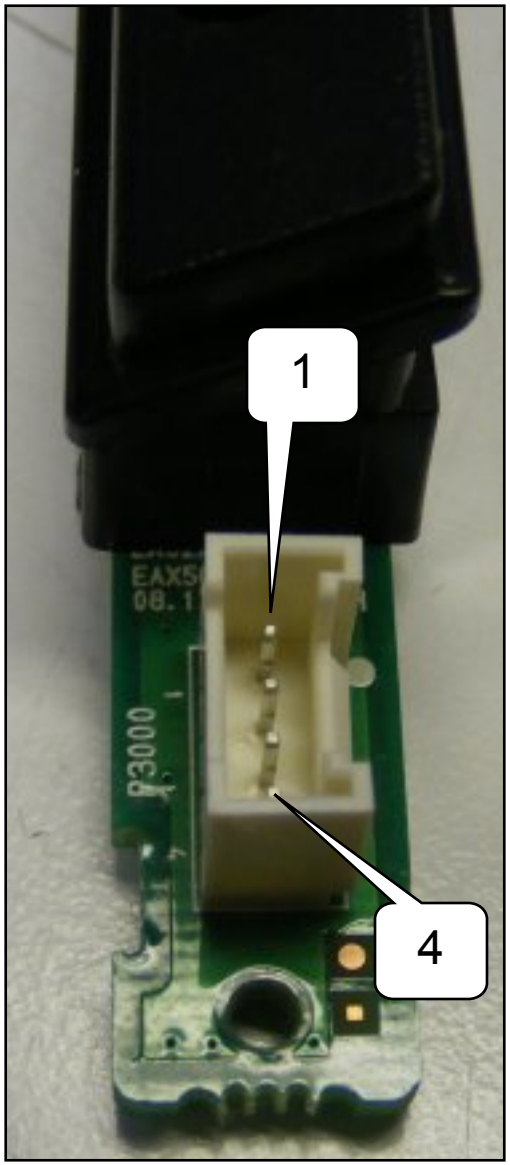
Pin	Label	STBY	Run	Diode Check
1	Key1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

Diode Check taken with meter in Diode Mode with all Connectors Removed

Side Key Assembly



Side Key Assembly P3000 Information



P3000 Resistance Measurements with Key pressed.

KEY	Pin 1 measured from Gnd		KEY	Pin 3 measured from Gnd
Power	270.5 Ohms		Volume (-)	270.5 Ohms
Input	1.8K Ohms		Volume (+)	1.8K Ohms
Menu	4.8K Ohms		CH (Dn)	4.8K Ohms
Enter	10K Ohms		CH (Up)	10K Ohms

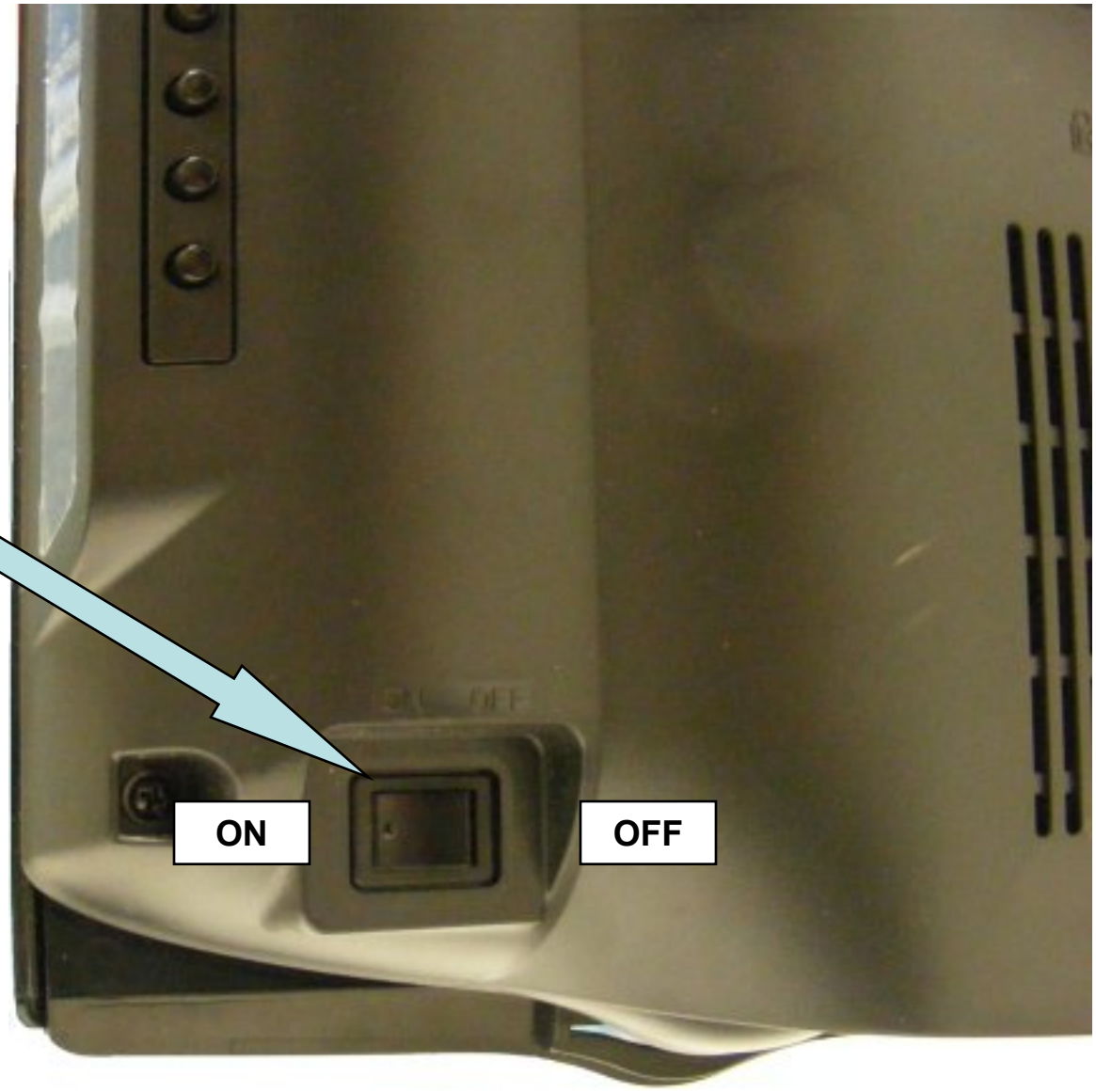
P3000 Voltage Measurements with Key pressed.

KEY	Pin 1 measured from Gnd		KEY	Pin 3 measured from Gnd
Power	0.179V		Volume (-)	0.179V
Input	0.906V		Volume (+)	0.906V
Menu	1.65V		CH (Dn)	1.65V
Enter	2.24V		CH (Up)	2.24V

P3000 Connector "Side Key" to "IR/LED Control

Pin	Label	STBY	Run	Diode Check
1	Key1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

Main Power Switch Note



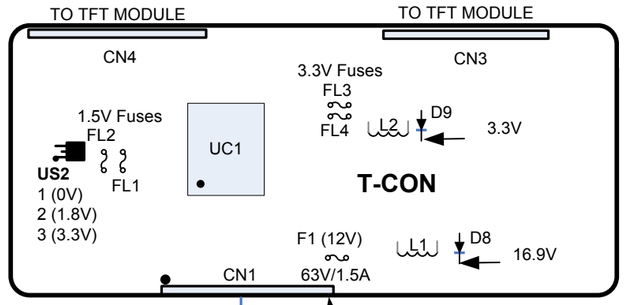
This section shows the 11X17 foldout that's available in the Paper and Adobe version of the Training Manual.

32LH30 INTERCONNECT DIAGRAM

P203 "SMPS" to CN1 "Ballast"

Pin	Label	STBY	Run	Diode Check
1	VBL	0V	24.52V	0.729V
2	VBL	0V	24.52V	0.729V
3	VBL	0V	24.52V	0.729V
4	VBL	0V	24.52V	0.729V
5	VBL	0V	24.52V	0.729V
6	Gnd	Gnd	Gnd	Gnd
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	Gnd	Gnd	Gnd	Gnd
10	Gnd	Gnd	Gnd	Gnd
11	VBR_A	0V	1.67V	Open
12	On/Off	0V	3.45V	Open
13	VBR_B	0V	3.40V	Open
14	Error	0V	0V	Open

Warning:
T-Con PWB under shield. Be sure to reinsert screws before operating set with shield removed.



CN1 CONNECTOR "T-CON" PWB CON PWB

Pin	Pin ID	STBY	Run V	Diode Test
7	LVDS-SEL	0V	0V	1.95V
8	PWM-DIM	0V	*0V	Open
9	OPC-OUT	0V	0V	1.75V
10	OPC-EN	0V	0V	1.75V
12	TXA4+	0V	1.2V	1.1V
13	TXA4-	0V	1.1V	1.1V
14	TXA3+	0V	1.2V	1.1V
15	TXA3-	0V	1.1V	1.1V
16	TXAC+	0V	1.1V	1.1V
17	TXAC-	0V	1.2V	1.1V
19	TXA2+	0V	1.2V	1.1V
20	TXA2-	0V	1.1V	1.1V
32	TXA1+	0V	1.2V	1.1V
23	TXA1-	0V	1.1V	1.1V
24	TXA0+	0V	1.1V	1.1V
25	TXA0-	0V	1.2V	1.1V

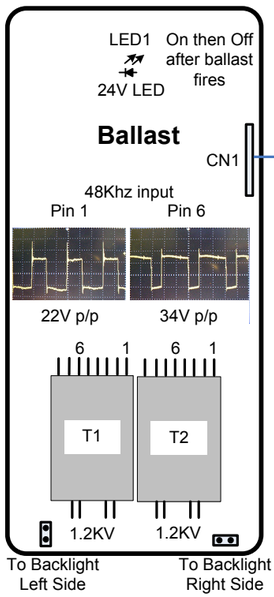
Pins 1, 11, 18, 21, 26, 34, 37, 42~46 are all Ground
Pins 1~6 and 47 Are not used

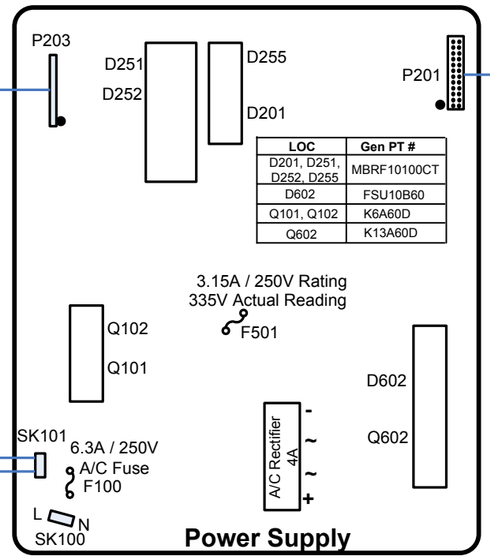
Pin	Pin ID	STBY	Run V	Diode Test
27	BIT-SEL	0V	3.24V	1.1V
29	TXB4-	0V	1.2V	1.1V
30	TXB3+	0V	1.2V	1.1V
31	TXB3-	0V	1.1V	1.1V
32	TXBC+	0V	1.1V	1.1V
33	TXBC-	0V	1.2V	1.1V
35	TXB2+	0V	1.1V	1.1V
36	TXB2-	0V	1.2V	1.1V
38	TXB1+	0V	1.1V	0.8V
39	TXB1-	0V	1.2V	1.1V
40	TXB0+	0V	1.1V	0.8V
41	TXB0-	0V	1.2V	1.1V
48	LVDS 12V	0V	12.1V	3.18V
49	LVDS 12V	0V	12.1V	3.18V
50	LVDS 12V	0V	12.1V	3.18V
51	LVDS 12V	0V	12.1V	3.18V

SMPS TEST 1: To Force Power Supply On.
Disconnect P800 on Main PWB.
Jump pin 7,8,9 or 10 (5V) to pin 2 using a 10K resistor. (Test Voltage Outputs 12V, and 24V).

SMPS TEST 2: Jump pin 2 to pin 20 (INV-ON). (Ballast and all voltages should turn on).

Do not run Ballast without heat sink attached

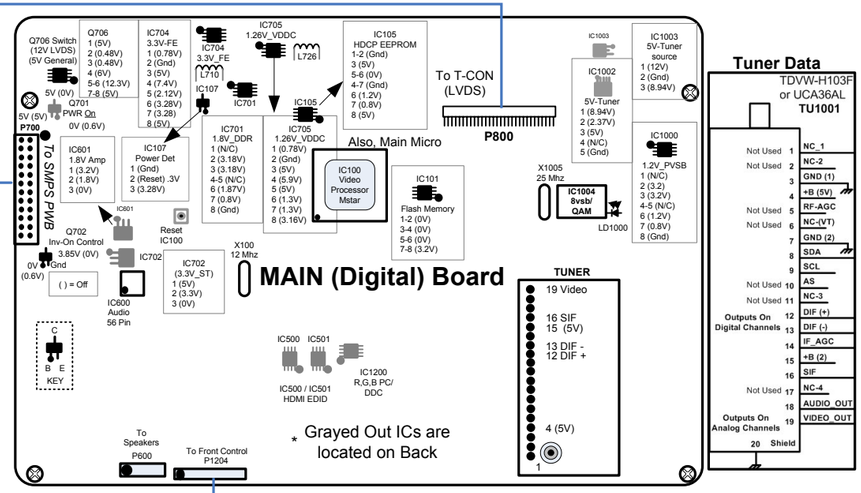




20 bit LVDS

P800 "Main" TO CN1 "T-CON"

Note: CN1 Pin 1 is P800 Pin 51



P201 Even"SMPS" to P700 "Main"

Pin	Label	STBY	Run	Check
24	PDIM	0V	3.2V	Open
23	nc	nc	nc	nc
22	Err Out	0V	0V	Open
21	BR1	0V	1.66V	Open
20	INV.ON	0V	4.67V	Open
19	nc	nc	nc	nc
17,18	24V	0V	24.8V	0.73V
15,16	Gnd	Gnd	Gnd	Gnd
13,14	12V	0V	12.3V	Open
11,12	Gnd	Gnd	Gnd	Gnd
7,8,9,10	5V	5.14V	5.14V	Open
3,4,5,6	Gnd	Gnd	Gnd	Gnd
2	PWR-ON	0V	4.99V	Open
1	nc	nc	nc	nc

Pin 21 BR1 (ADIM Analog Dimming)
Fixed and not used

Pin 24 PDIM (Digital Dimming) can vary according to type of signal being processed and the OSD Backlight setting.
0.6V 0% to 3.3V 100%.
Output from the Video Processing chip IC100.

Main Power Switch

Side (Key) Controls

P101

Front PWB Assembly (Interface)

J3

IR Receiver
Power Button

J1

P101 o J3 Front PWB

Pin	Label	STBY	Run	Diode Check
1	Key1	3.3V	3.3V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key2	3.3V	3.3V	Open
4	Gnd	Gnd	Gnd	Gnd

P1204 CONNECTOR "MAIN PWB" to J1 "Front IR / LED PWB

Pin	Label	STBY	Run	Diode Check
1	SCL	3.3V	3.3V	Open
2	SDA	3.3V	3.3V	1.67V
3	Gnd	Gnd	Gnd	Gnd
4	Key1	3.3V	3.3V	1.4V
5	Key2	3.3V	3.3V	1.1V
6	5V ST	5.1V	5.1V	1.5V
7	Gnd	Gnd	Gnd	Gnd
8	Gnd	Gnd	Gnd	Gnd
9	IR	4.8V	4.8V	Open
10	Gnd	Gnd	Gnd	Gnd
11	3.3V_ST	3.29V	3.29V	0.76V
12	POWER On/Off	0V	3.29V	Open

LG TRAINING CENTER

32LH30

Direct View LCD

This concludes the 32LH30 training presentation.

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